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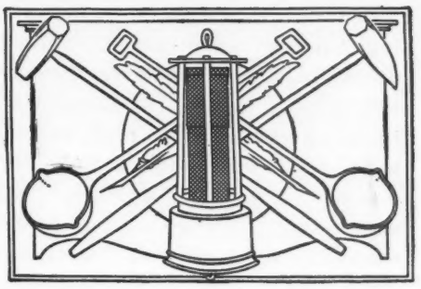

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*Illustrated.*

## The Bureau of Mines

On July 1 the Bureau of Mines came into formal existence, but without a permanent head—a possibly unprecedented condition, certainly an unfortunate one. The usefulness and character of such an organization are determined largely by the impress of the first director. The Geological Survey owes much of its prestige to Clarence King, who trained the sapling to respectable growth. The Bureau of Mines similarly requires the guiding hand of a broad and competent man.

The headship of the new bureau has fallen temporarily to Dr. George Otis Smith, director of the Geological Survey, who, it is understood, will give way for the permanent head when the Administration has made up its mind. This situation results from personal and political animosities and the interference of the management of the Geological Survey in a manner that has called forth general condemnation from the mining press and many persons prominent in the mining industry.

There was not a general demand for the creation of a bureau of mines, the bill for which was lobbied through Congress. As created it has great power for harm to the mining business. It also has power to be useful. Whether it will be harmful or useful, or more or less of both, will depend chiefly upon the inspiration of its primary management.

Let us pause here to say that most of the new legislative program that has lately been disturbing industry is not bad. The scheme for railway regulation is not bad. The very persons who are now drawing long faces about some of these things will some day be loudest in their applause for them. But there is nevertheless a real ground for fear as to how the administration and its bureaucracy may construe some of these laws and exercise their authority. It is not, for example, the principle of conservation of our forests that excites outcry, but the unnecessarily irritating, perhaps unjust, way in which the officials of the Forest Service have acted in numerous cases. It is this sort of thing that we want to exclude in the Bureau of Mines.

Since we are going to have a Bureau of Mines we want to see it developed in the most efficient manner possible. We do not want to see it mixing into things with which it has no business, and we do not want to see it in response to requests from other bureaus giving pseudo-expert opinions about things whereof it knows not. We do not want to see it advising that copper smelters in the West can and ought to make sulphuric acid or defining the commercial meaning of "calamine" as silicate of zinc and we do not want to see it compel citizens to defend themselves in the courts against inexpert absurdities.

## Pig Iron and Steel Production of the World

We have now the complete reports of the three principal iron-producing nations, which together furnish more than 80 per cent. of the iron and steel of the world, for 1909. The difference between that year and 1908 was so sharp that a period

of three years is included in the accompanying table, which shows the pig iron and steel made, reduced to metric tons, for purposes of comparison.

PIG IRON PRODUCTION.

| | 1907. | 1908. | 1909. |
|---|---|---|---|
| United States | 26,193,863 | 16,190,994 | 26,208,198 |
| Germany | 13,045,760 | 11,813,511 | 12,917,653 |
| Great Britain | 10,082,638 | 9,438,477 | 9,818,916 |
| Total | 49,322,261 | 37,442,982 | 48,944,767 |

STEEL PRODUCTION.

| | | | |
|---|---|---|---|
| United States | 23,735,737 | 14,247,619 | 24,338,302 |
| Germany | 12,063,631 | 11,186,379 | 12,049,834 |
| Great Britain | 6,627,112 | 5,380,372 | 5,975,735 |
| Total | 42,426,480 | 30,814,370 | 42,353,871 |

The wide difference between 1907 and 1908 was due chiefly to the extraordinary reduction of output in the United States; but Germany and Great Britain both showed decreases which were large for the trade of those countries, where the fluctuations are usually much smaller than in our own country. Last year there was a recovery, practically to the standard set in 1907, in the United States and Germany; while in Great Britain there was also an increase over 1908, but not to the level of the earlier year. Taking the totals, there was in 1908 a decrease of 11,879,279 tons in pig iron, and of 11,612,110 tons in steel, as compared with 1907; while in 1909 the decrease from 1907 was only 377,494 tons of pig iron and 72,609 tons in steel. The contrasts are the sharpest ever shown in three successive years in the iron trade. It is true, however, that our own advance in production was greater than was really warranted by the consumptive demand as the experience of the first half of the current year has proved; and in Germany also there is complaint of large unsold stocks and slower trade. Nevertheless, the actual sales and consumption of last year were very much larger than in the period following the panic of the closing months of 1907, though business has been done generally at a lower range of prices. The present probability is that 1910 will show some reduction from the totals of 1909, though it will be nothing like the decline of two years ago.

There are marked differences in the steel-making practice of the three countries, and the analysis of their steel production in 1909, given in the second table herewith, will be found of interest.

In the United States the basic open-hearth furnace is now the chief steel producer, though the acid bessemer converter still holds a high place. In Germany the basic converter is most in favor, with the basic open-hearth furnace second. Less than 4 per cent. of the German steel was made by the acid processes, a result due necessarily to the nature of the iron ores which form the basis of the German industry. In Great Britain the open-hearth furnace is most largely in use, but basic steel forms only a little over one-third of the total.

It is noticeable that steel from the electric furnace has now found a place in the returns of production in this country and Germany. Its proportion to the total in both countries last year was only 0.1 per cent.; but it may be expected to increase.

METHODS OF STEEL PRODUCTION.

| | United States | | Germany | | Great Britain | |
|---|---|---|---|---|---|---|
| Converter: | Tons. | Per Cent. | Tons. | Per Cent. | Tons. | Per Cent. |
| Acid | 9,480,076 | 39.0 | 151,148 | 1.3 | 1,128,819 | 18 9 |
| Basic | ..... | .... | 7,517,451 | 62.4 | 632,133 | 10.6 |
| Total | 9,480,076 | 39.0 | 7,668,599 | 63.7 | 1,760,952 | 29.5 |
| Open-hearth: | | | | | | |
| Acid | 1,093,687 | 4.5 | 311,812 | 2.6 | 2,807,369 | 47.0 |
| Basic | 13,632,152 | 56.0 | 3,967,581 | 32.9 | 1,407,414 | 23.5 |
| Total | 14,725,939 | 60.5 | 4,279,393 | 35.5 | 4,214,783 | 70.5 |
| Crucible, etc | 109,073 | 0.4 | 84,067 | 0.7 | ..... | .... |
| Electric | 23,314 | 0.1 | 17,773 | 0.1 | ..... | .... |
| Total | 24,338,302 | 100.0 | 12,049,834 | 100.0 | 5,975,735 | 100.0 |
| Prop. steel to pig | 92.9 | ..... | 93.3 | ..... | 60 9 | ..... |

## Engineering Degrees

The subject of engineering degrees is one that has interested educationalists, and also insofar as it pertains to mining and metallurgical engineering, our readers, as many discussions in past volumes of the JOURNAL show. It is not a subject of great importance in our opinion. We are inclined to think that most technical men forget their possession of a degree soon after their graduation. However, we are ready to agree with the Society for the Promotion of Engineering Education, of which a committee has just made a report, as to the desirability of uniformity in engineering degrees.

We are rather amazed at the variety and fantasy of some of the degrees bestowed by American institutions that this committee has unearthed. Thus, we find bachelor of cement engineering, electrometallurgical engineer, civil engineer in architecture, ceramic engineer, doctor of agriculture. This manifests specialization carried almost to the absurd.

We deprecate the bestowal of such professional degrees as mining engineer and metallurgical engineer, which terms indicate a vocation. A man who has never received a collegiate degree but is by practice a mining engineer, has a perfect right to call himself such, and if he chooses to label himself with a title of his business (which most engineers do not) he has a perfect right to abbreviate it to M.E. We do not see why any technical school should desire to confer such a degree; in the first place the fresh graduate is not a mining engineer, and in the second place, the degree is not distinctive, as we have pointed out above.

The committee of the Society for the Promotion of Engineering Education has not presented exactly the above view, but evidently it had somewhat the same thought. Among its recommendations are the following:

A four-year engineering course should normally lead to the degree bachelor of science, to which should be added a specifying phrase, as for example, bachelor of science in civil engineering.

The professional engineering degrees C.E., M.E., etc., should be given only to graduates who present satisfactory evidence of professional work of superior quality extending over not less than three years, and who submit a satisfactory thesis.

These recommendations are sound, especially the first one.

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The coal-miners' strike in northern Illinois has settled down to a test of endurance, and it seems probable now that there will be no general settlement, but a gradual crumbling away on one side or the other. Southern Illinois broke away from the State association three weeks ago and made its own settlement.

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The spelter market became a trifle stronger upon the report that some of the smelters were curtailing their output. The zinc smelters generally do this when the market will not take their production except at a sacrifice. They are in business as producers, and have no direct concern with the stock market. This is a difference between the zinc business and the copper business.

## June Dividends

The accompanying table shows the amount per share and total amount of the dividends paid during June, 1910, by a number of mining and industrial companies in the United States, Canada and Mexico.

| U. S. Mining Companies. | Situation. | Amt. per Share. | Amt. Paid. |
|---|---|---|---|
| Am. Smelters, pf. A. | U. S. | $1.50 | $255,000 |
| Am. Smelters, pf. B. | U. S. | 1.25 | 375,000 |
| Bunker Hill&Sul.,s.l. | Ida. | 0.30 | 98,100 |
| Butte Coal, c..... | Mont. | 0.25 | 250,000 |
| Caledonia, s.l..... | Ida. | 0.01 | 13,000 |
| Calumet & Ariz., c.. | Ariz. | 1.00 | 200,000 |
| Calumet & Hecla... | Mich. | 7.00 | 700,000 |
| Colorado, s.l..... | Utah | 0.08 | 80,000 |
| Cumberland-Ely, c.. | Nev. | 0.10 | 130,000 |
| Doe Run Lead..... | Mo. | 1.50 | 98,623 |
| Elkton, g..... | Colo. | 0.01½ | 37,500 |
| El Paso Gold King.. | Colo. | 0.02 | 20,000 |
| Fed. M. & S., pf. sl... | Ida. | 1.75 | 210,000 |
| Goldfield Cons., g... | Nev. | 0.50 | 1,779,188 |
| Homestake, g..... | S.Dak. | 0.50 | 109,200 |
| International Nickel | N. Y. | 1.50 | 133,689 |
| Inter. Sm. & Ref.... | Utah | 2.50 | 250,000 |
| Iron Blossom, s.l... | Utah | 0.06 | 60,000 |
| Little Bell..... | Utah | 0.05 | 15,000 |
| Mary McKinney, g.. | Colo. | 0.01 | 13,092 |
| Nevada Cons., c.... | Nev. | 0.37½ | 431,500 |
| North Star, g..... | Cal. | 0.50 | 125,000 |
| Phelps Dodge, c.... | U. S. | 2.50 | 1,123,365 |
| Quincy, c..... | Mich. | 1.25 | 137,500 |
| Republic Mines, g... | Wash. | 0.01 | 10,000 |
| Round Mountain, g. | Nev. | 0.04 | 34,650 |
| Snowstorm, c..... | Ida. | 0.01½ | 22,500 |
| St. Joseph Lead.... | Mo. | 0.15 | 150,000 |
| United Verde, c.... | Ariz. | 0.75 | 225,000 |
| Uncle Sam, s.l..... | Utah | 0.02 | 10,000 |
| Utah Copper, c..... | Utah | 0.75 | 550,218 |
| Yukon Gold..... | Alas. | 0.10 | 350,000 |

| Foreign Mining Companies. | Stiuation. | Amt. per Share. | Amt. Paid. |
|---|---|---|---|
| Kerr Lake, s..... | Ont. | $0.50 | $ 300,000 |
| Nipissing, s..... | Ont. | 0.25 | 300,000 |
| Rio Plata, s..... | Mex. | 0.10 | 37,343 |

| U. S. Industrials. | Situation. | Amt. per Share. | Amt. Paid. |
|---|---|---|---|
| Gen. Chem., com... | U. S. | $1.25 | $92,626 |
| Natl. Lead, pf..... | N. Y. | 1.75 | 426,433 |
| Sloss Sheffield, com. | Ala. | 1.25 | 125,000 |
| Standard Oil..... | U. S. | 9.00 | 8,730,000 |
| U. S. Steel Cp., com. | U. S. | 1.25 | 6,353,781 |

## Chronology of Mining for June, 1910

*June* 4—Old Homestead zinc mill, at Platteville, Wis., burned.

*June* 8—Five killed by falling cage at Richard mine of the Thomas Iron Company, at Dover, N. J.

*June* 13—Proposed consolidation of the El Rayo, Dolores and Mines Company of America companies announced.

Black Mountain mine, at Cerro Prieto, Son., Mexico, closed because of exhaustion of the ore.

*June* 15—Fire destroys surface plant of Empire State property, Cripple Creek, Colo.—Case of Silver King Consolidated Mining Company vs. Silver King Coalition Mines Company concluded at Salt Lake after taking 4,000,000 words of testimony, beginning in December, 1909.

*June* 16—Arizona-New Mexico statehood bills passed by Congress.

*June* 17—Announcement of proposed issue of $2,500,000 bonds by Utah Copper Company to build a railroad from Bingham to Garfield.

*June* 20—Receiver appointed in Arizona for the Cieneguita Copper Company of Sonora.

## William P. Blake, LL.D.—A Tribute

By George W. Maynard *

The best way to get to know a man is to work with him, travel with him and camp and bunk with him, and if this experience—prolonged for many years in comfort, discomfort and some hardship—results in strengthening the bonds of friendship, both parties are indeed to be congratulated.

At Troy, in November, 1871, was held the third meeting of the American Institute of Mining Engineers, and it was at that meeting I first met William P. Blake, a most striking personality, with an altitude of fully six feet, crowned with snow-white hair like a lion's mane, but with a skin without a wrinkle, a ruddy complexion and brilliant eye. The meeting was followed by an excursion to the iron mines back of Port Henry, on Lake Champlain, thus affording all of us an opportunity of "discovering one another," as Raymond has so happily expressed it. This was the beginning of an acquaintance which soon ripened into friendship and in the course of time into intimate professional relations.

We frequently worked together in mine examinations, the first having been the Alice mine, at Butte, which at that time was one of the most important mines in the district. I recall that I was greatly impressed by his grasp of the geological conditions and the facility with which he illustrated the vein formations with colored pencils. In this and subsequent work in the Butte district, his industry both in the field and working up his notes was untiring.

The influence of his reputation was illustrated by an amusing episode.

He had been retained in an apex suit at Butte, which, however, had not yet come to trial, but the fact of his being retained was widely published, so that when he returned to Salt Lake City he was asked to accept a retainer in another suit which had been brought in connection with a similar contest in Utah. He promptly declined to act without in the first place making an examination. The result of the examination was that he advised his client that he would lose his case if it came to trial. During his absence, however, the employment of Professor Blake was made known through the papers, so the other side got scared and settled.

During late years we were much together in Arizona. He visited me during a Christmas week at the Santa Rita placer mines. Our daily journeys in the saddle in that beautiful but little known country were a joy and a liberal geological education. During my many visits to Tucson of late years, it was my good fortune to be in almost daily intercourse with my friend.

He selected Tucson as a winter home on account of the illness of one of his sons, who subsequently died there. A mining department had been established as an adjunct to the University of Arizona, and on the resignation of the first director, Professor Blake became his successor. He was so fortunate as to have able and enthusiastic men associated with him, so that notwithstanding limited resources, excellent work was done and well trained men were graduated, as I happen to know by employing some of them as my assistants in the field. Professor Blake was an ideal teacher and greatly beloved by the students because of the personal interest he took in every man; in fact, they regarded him as a comrade.

Up to the time of his death he was Territorial geologist, I believe without salary, and rendered very efficient service. The geological collection brought together almost entirely through his efforts is the most important and instructive in the Southwest.

After he became a permanent winter resident of Tucson, he built a beautiful house on the mesa near the university. The material was a tuff of bluish tint from a quarry which he had opened. The thick walls and broad stone piazza made it a delightful resort from the torrid heat. His well stocked library was a place to revel in. Mrs. Blake, a beautiful woman, also with a crown of snow-white hair, made a striking and lovely picture. The charming and unostentatious hospitality of my friends can never be forgotten by those who were so fortunate as to experience it.

For many years I urged Professor Blake to write for publication his Western experiences, beginning with his first trip to California. His scientific work is well known to the geological and mining profession and will undoubtedly be fully set forth by Doctor Raymond, but if he failed to leave a history of his more than half a century of active life, extending from Europe to Japan, and Mexico to Alaska, it is to be regretted.

As to his professional memoranda, he adopted an admirable system. For each examination he used a small thin crossed-hatch note book, and these books were numbered and dated *seriatim*, so it will be relatively easy for his literary executor to give us an accurate history of his professional work.

*"Facile princeps." "Fama semper vivat."*

*Mining engineer, 20 Nassau street, New York.

## Bureau of Mines

WASHINGTON CORRESPONDENCE

President Taft has taken action for the temporary administration of the newly created Bureau of Mines by designating Director George O. Smith, of the Geological Survey, to act as head of the bureau, pending the selection of a permanent chief. Director Smith states that it is his intention to manage the bureau from a purely temporary standpoint and to take no step involving general policies. The first action has been that of dividing the personnel of the old technology branch of rhe Geological Survey into two parts: One including all employees who have heretofore been engaged in the testing of structural materials; the other division includes the remaining branches of the service which were originally transferred to the Bureau of Mines. The first division goes to the Bureau of Standards while the Bureau of Mines receives the remainder of the force. Official action to this effect was taken on July 1, following consultations between the Secretary of Commerce and Labor under whose direction the Bureau of Standards is organized and the Secretary of the Interior who has jurisdiction of the Bureau of Mines.

Another important step has been taken in arranging for the continuation of the structural materials work on substantially its present basis, nominally under the jurisdiction of the Bureau of Standards, but in practice under that of the Bureau of Mines. Whether the actual work of testing materials will be indefinitely continued at Pittsburg or not is uncertain, but the expectation is that it will be. This view is entertained by some of the Pittsburg congressmen. The claim is made that the plant at Pittsburg may not have been transferred along with the machinery, and there is a belief among officials that in the absence of additional legislation the work may not be suffered to go on at Pittsburg after all. The probability that there will be more legislation on this subject at the coming session of Congress is decidedly greater than it has been.

President Taft's failure to appoint a head for the Bureau of Mines has been variously interpreted. Some regard it as evidence that the president has made up his mind to appoint someone entirely outside the present service and to refuse his assent to the partisans of either of the two leading candidates who are now in the service, while others consider the delay to mean merely that he has not had time to satisfy himself between the two candidates who are in the field. Director Smith, of the Geological Survey, when asked about this phase of the situation expressed the opinion that "the field is entirely open and nothing has as yet been determined upon, probably owing to pressure upon the President's time and attention." There is no positive knowledge regarding the disposition of the Executive, and official information was refused prior to the departure of the Executive for the summer. The controversy about the appointment has, however, reached an exceptionally aggravated stage.

## The International Smeltery at Toole, Utah

SALT LAKE CORRESPONDENCE

The International Smelting and Refining Company's new plant at Tooele, Utah, is nearly completed. By the first week in July, one reverberatory furnace will be ready for firing and another of the five is nearly completed. Space has been reserved for a blast furnace with a capacity of 1500 tons charge, but its construction will not commence until after the reverberatories have been started and its use is required. When the plant starts, three of the reverberatories will be used. The steel framework was practically completed July 1, though riveting and corrugated iron work will not be finished until Aug. 1. Some difficulty has been experienced in obtaining all of the steel workers needed, but the force is now complete. Good progress has been made. The ore bins are nearing completion; the custom and storage bin near the sampler is of 6000 tons capacity, and ore will be taken to and from the sampling mill by belt conveyers, which are now being installed.

The mill is fitted with two sets of Brunton samplers driven by electric motors. Most of the belting and machinery has been installed, and the mill is practically completed. The roaster storage bin is of 5000 tons capacity, and from here the ore will be taken by belt conveyers to scales and to the roasters. The roaster building will be done by the second week in July, and track is being laid underneath the plant. The McDougal roasters have been installed some time and are now being lined. They will be completed July 15. The local tramway system for handling ores will use electric power and enough of this has been laid for use in beginning operations. Ore will be received from the Utah Consolidated during July, and 15,000 tons will be accumulated before operations are begun.

Some ore has already been sent over the Utah Consolidated tramway and has been shipped to Garfield via the Tooele Valley railroad to complete the old Utah Consolidated smelting contract. Unless some unforseen delay occurs, it is expected that the first furnace will be blown in the first week in August.

## The Porcupine District.

TORONTO CORRESPONDENCE

Dr. R. W. Brock, director of the Canadian Geological Survey, has returned from an inspection of the Porcupine gold district. He reports that probably 2000 people are in the camps about Porcupine. A boom seems imminent, prices of claims are far above any determined value and buying and selling is on a speculative basis. Altogether about 9000 claims have been staked, the great majority having no real present or prospective value. Quartz is remarkably widespread over the district, and visible gold is abundant in some showings and has been found at numerous and widely separated points. Most of the gold occurrences are in Tisdale township but some of them are in Whitney, Shaw and the Forest Reserve. A new discovery has just been announced from Kamiskotia lake, west of the Matagami river and the older discoveries are at Nighthawk lake.

### KEEWATIN AND HURONIAN ROCKS PREDOMINATE

The prevailing rocks are greenstones (including old diabases) quartz-porphyries and schist, presumably of Keewatin age, with some slates, greywackes and conglomerates, probably Huronian. The quartz seems to occur in any of the rocks and in all manner of forms. There are some well defined veins, some large apparently isolated masses, the so-called "domes," and numerous irregular quartz stringers, which may swell out in places to large masses, that may or may not have a vertical extension. The quartz holds many inclusions of more or less altered country rock, in and along which pyrite is rather extensively developed. The gold, which is often coarse, is distributed in much the same way as the pyrite, with which it is usually associated, but some may be found in the pure quartz. A little galena, blende and chalcopyrite may also be present. A ferruginous carbonate, probably ankorite or siderite, is, next to quartz, the most abundant gangue mineral. Calcite, chlorite, talc and feldspar were also noticed.

### PROPERTIES IN STRONG HANDS

Doctor Brock regards it as fortunate that a number of strong interests have taken hold in the initial stages of the camp, which insures intelligent development and a thorough test of some of the more promising prospects. The "show" properties at present are the Timmins, Dome and Foster. At the Timmins about 7 miles west of Porcupine lake, a clearing of 40 acres has been made and substantial mine buildings erected. The plant comprises two boilers, a compressor, hoist and dynamo; a crusher and small prospecting stamp mill are being erected.

The buildings are lighted with electricity. On the largest of the veins exposed, with a maximum width of about 20 ft., three shafts have been sunk, the distance between the first and last being about 800 ft. The deepest shaft is down about 90 ft. and is in a 12-ft. vein at the bottom, where good ore carrying free gold is found. About 300 tons of promising ore is on the dump, several lots of which sent out for sampling are said to have yielded high results. The fresh ore seems quite as good at 90 ft. as that on the surface. A number of other veins have been stripped, one of which has been traced about 300 ft. and shows gold at various points.

The Dome is undergoing active development. Two large masses of quartz, about 60 ft. in width and of considerable length, are opened up. Coarse gold shows on the surface of the quartz in some places and systematic sampling is said to have yielded satisfactory results. Several shafts have been sunk and diamond drilling is to be undertaken to determine conditions at depth. The property is equipped with a good plant and buildings and a small test mill is being installed.

The Foster vein is a belt of the iron carbonate filled with transverse masses and veins of quartz containing many inclusions of the carbonate, in which sulphides and gold have been deposited. This vein has been traced for nearly half a mile, and where exposed has a width of from 6 to 20 ft. Fine showings of gold occur and the clean-cut character and extensive horizontal dimensions of the lode, suggest that it may have an equally strong vertical extension.

RÉSUMÉ

Doctor Brock concludes that although Porcupine is as yet in the prospect stage, it has some of the essential qualities of a gold camp, sufficient to have induced experienced mining men to take up options at high figures and undertake large expenditures. Access to the district is now comparatively easy, the most popular route being via Kelso at Mile Post 222 on the Temiskaming & Northern Ontario Railway by stage for 12 miles to the inlet of Frederickhouse lake, and thence by a gasolene-launch service.

## Duty on Zinc-Lead Ores

In an appeal from a decision of the collector of customs, the Board of General Appraisers on June 29 decided that ores containing both lead and zinc are dutiable not only on the lead content as provided for under paragraph 181, Tariff Act of 1909, but are also liable to the duties provided for the zinc content under paragraph 193 of the same act.

The collector of customs assessed duty on both the zinc and lead contents under the provisions of paragraphs 181 and 193. The importers claimed that paragraph 181 applies and that the shipments are dutiable on the lead content and urge that the assessment of duty on the zinc content as well under paragraph 193 was in error.

General Appraiser Fischer, who wrote the decision overruling the importers' claim, stated "if it be seriously urged that ores cannot be separated for the purpose of classification then it is true that as zinc-bearing ores containing less than 10 per cent. of zinc are provided for free of duty under paragraph 193, the lead content of such ores would escape the duty provided for under paragraph 181. In our opinion it would be error to hold to this effect. The duty is assessable on the lead or the zinc, or both, as the case may be, irrespective of the classification of the remaining constituents of such ores under other paragraphs. As well as may it be said that as silver ores are provided for free of duty it is permissible to ignore the lead content when present in such ore. An examination of the amount of lead and zinc in the respective shipments shows at a glance the varying proportions and the substantial amounts of both metals present in the importations. We are not persuaded that either of such metals should be ignored for classification purposes."

## Withdrawals of Mineral Land

President Taft has signed orders withdrawing from public entry 8,495,731 acres of power site, phosphate, coal and petroleum lands. He has also appointed a board of five army engineers to pass on reclamation projects to be completed under the recent appropriation of $20,000,000.

These withdrawal orders are the first specifically authorized by law. The orders include public land in which workable coal is known to occur, both in the States and in Alaska.

The water-power sites withdrawn by President Taft cover a total of 1,454,499 acres. The phosphate lands withdrawn total 2,594,113 acres, and the petroleum land 4,447,119 acres. The areas involved in the power site withdrawal are as follows: Arizona, 107,550 acres; California, 47,819; Colorado, 201,549; Idaho, 230,971; Montana, 122,315; Nevada, 14,501; New Mexico, 14,536; Oregon, 176,721; Utah, 379,912; Washington, 55,439, and Wyoming, 103,396.

The phosphate land withdrawals are divided as follows: Florida, 27,400 acres; Idaho, 1,102,317; Utah, 107,545, Wyoming, 1,381,851. Petroleum lands withdrawn cover the following: Arizona, 230,400 acres; California, 2,482,750; Colorado, 87,474; Louisiana, 314,720; New Mexico, 419,901; Oregon, 74,849; Utah, 581,564 and Wyoming, 255,561 acres.

## Important Mexican Decision

A judicial decision involving $11,529,542 has been recently handed down in the second civil court of Mexico, in favor of the Mexican Mine Development Company. George D. Barron, its president, was ordered to pay within eight days from June 29, $8,324,830, and interest on that sum at 6 per cent. from Dec. 21, 1903, as well as court costs. The case has been in court since 1900. The Mexican Mine Development Company was organized previous to 1900. The company authorized the purchase of mines at Teziutlan and Barron is said to have secured titles in his own name. Soon after the properties were bought, a meeting of the company was called by President Barron and it was dissolved, the titles remaining in the name of Barron. Some time later the stockholders claimed that the dissolution was illegal and suit to recover the property was begun. Claim was made for $5,793,920, as the value of the output of the mines during the time they were worked. The demand was also made for 85 per cent. of $4,000,000, the estimated value of the plant. The fee granted the attorney for the development company totals $2,305,908.

STATEMENT BY MR. TOWNE

Robert S. Towne, president of the company which acquired the Teziutlan property, made the following statement from the New York office: "The Teziutlan Copper Mining and Smelting Company knows nothing of the judgment against George D. Barron in Mexico, except what is published, and except that it is informed that the judgment was taken without service on Mr. Barron in Mexico and without his appearance there. That is to say, it was a judgment by default and without service against a nonresident, which can have no effect in the United States. And whether the courts of so highly civilized a country as Mexico would sustain a judgment for 23,000,000 pesos, even on the facts claimed against Mr. Barron or whether the judgment would be set aside if Mr. Barron applied to the Mexican court, are questions for him and not for this company. The judgment has not the slightest relation to any interest or property of the company which acquired its mines about a dozen years ago, and at least several years before there was any judgment or suit against Mr. Barron, and holds its property by perfect and absolutely unencumbered titles. Mr. Barron, a considerable time ago disposed of all his stock in the company and resigned as an officer and director. As, therefore, this matter concerns him and not this company, we must refer to him for further information."

# DETAILS of PRACTICAL MINING

Notes of Interest to Prospectors and Operators of Small as Well as Large Mines. Things That Have to Be Done in Everyday Mining

## The Original Consolidated Self-Dumping Skip

A self-dumping skip of novel and satisfactory design has been worked out and used for some time at the Original Consolidated mine, Butte, Mont. In fact, so satisfactory has the operation of these skips been at the Clark mines, that they have been copied by the Amalgamated company, and more recently by the Miami Copper Company, at Globe, Ariz. The particular feature of the design of the skip is the dump mechanism which is simple and self-contained. The skip is durable and also of convenient proportions.

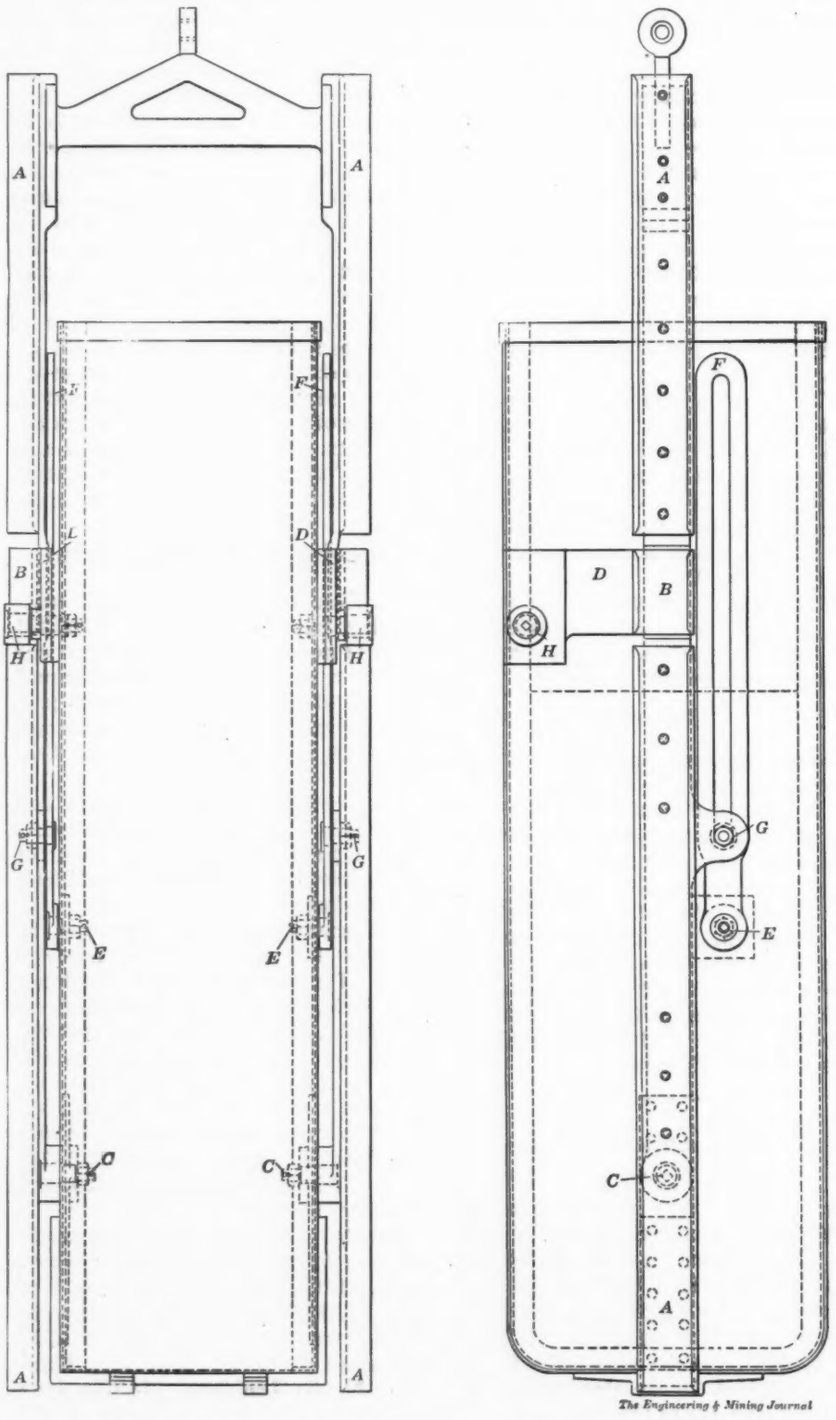
### Long Guide Shoes

The constructional details of the Original skip are shown in the accompanying drawing. As will be noticed, the guide shoe extends over the full length of the skip bail. This is one of the most important features of the design, for the usefulness of any hoisting conveyance is limited the life of the shoes. By distributing the wear over a large surface the life of these is prolonged materially. This is especially necessary with the fast hoisting practised at Butte.

The portion of the shoe marked *B* is not connected to the bail, as will be explained. The skip is hung from the bail on the axles *C*. The portion of the guide shoes *B* is riveted to plates *D* on the skip body, instead of being fixed to the bale. The support afforded by this part of the shoe serves to keep the skip in a vertical position in the shaft. Slotted steel bars *F* are bolted to the skip body and rotate about *E* as pivots. The skip bail has a projection which extends over the lower end of the slotted bars and the bolts *G* pass through the slots and the extension of the skip bail. In dumping these bolts slide up and down the slots.

### Dump Mechanism

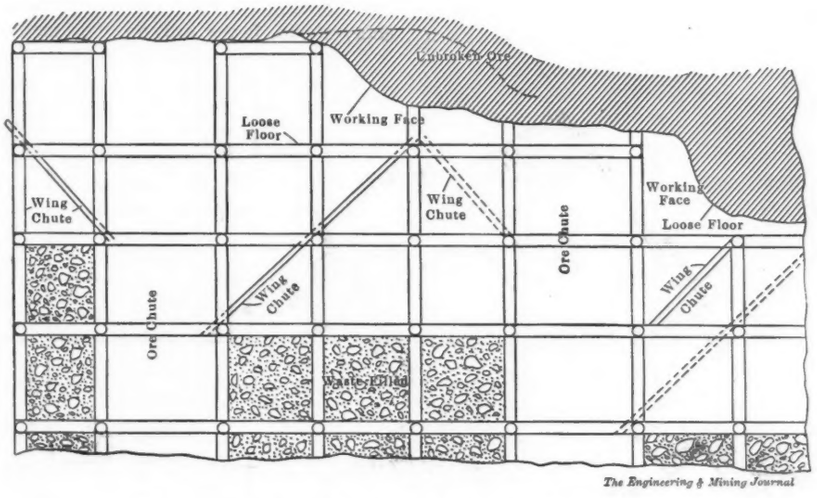
As usual with self-dumping skips, there is a roller *H* fastened on either side of the skip at a point near its top and close to its front edge. These rollers engage, at the discharge point, in tracks curved up and away from the shaft so that as the skip is hoisted it is tilted forward about the axles *C* and discharges its contents. As the skip swings down, the bolts *G* slide up the slotted bars *F* which swing between the skip and its bail. The guides in the shaft (or headframe) must, however, be cut away at the point of discharge so as to allow the portion of the shoe *B*, that is fixed to the skip to swing free. The skip turns over until the bolts reach the end of the slotted bars. On lowering the skip, the rollers run back down the curved guide track and the skip body is again swung into a vertical position. The governing action of the slotted




Self-dumping Skip Used at Original Mine, Butte, Mont.

bars is more positive and quicker than that of the arrangement of projecting lugs to engage a crossbar, ordinarily used on self-dumping skips. The top of the curved guides for the rollers is cut away at the point reached by the rollers when the skip is tilted as far as the slotted dump bars permit. This allows the dumped skip to be raised farther so that slight overwinding does no damage.

The skips at the Original mine are 11 ft. 4 in. deep, 3 ft. 5 in. from back to front and 3 ft. 4 in. wide. The total length of the guide shoes is 14 ft. 2½ in., 1 ft. 2½ in. being cut away from the bail at a point 5 ft. below the top. The diverting rollers are centered at a point 8 ft. ½ in. from the bottom of the skip and the bail hung 2 ft. 1½ in. above the bottom. The slotted bars are centered 2 ft. 8 in. above the skip bottom. The skip is constructed of 5/16-in. steel.




SECTION OF STOPE SHOWING DIVERTING WING CHUTES

## Lack of Oxygen in Hydraulic Air at Cobalt

When the air from the hydraulic plant at Ragged Chutes, Cobalt district, Ontario, was first turned on it was found that it was practically impossible to burn candles in the mines where it was used. It was claimed that this was due to the absorption of oxygen by the asphalt with which the inside of the pipes were coated, and that this effect would soon pass off. It was soon found, however, that hydraulic air contains an appreciably less percentage of oxygen than ordinary air, and analysis demonstrated that it contained only 17.7 per cent. oxygen, which is 3 per cent. lower than ordinary air. This is due to the oxygen going into solution in the water during compression, when a pressure of 130 to 135 lb. per sq.in. is maintained. The lack of oxygen does not apparently trouble the miners, but besides the difficulty experienced in keeping lights, the effect of the gases from exploded dynamite is much quicker and more serious than was found to be the case with air compressed by machinery.

## Eliminating Shoveling in Square Set Stopes

It is generally agreed that the shovel is the most expensive, i.e., uneconomic, implement the laborer uses about a mine. The ideal method of mining any deposit is that method which, satisfactory in other respects, necessitates the least possible handling or shoveling of the ore. An excessive amount of shoveling, and carting of ore to chutes in small wheelbarrows, is done in most mines where square-set stoping is practised.

At the Argonaut mine, Jackson, Amador county, Cal., this is eliminated in the stopes to a large extent by building plank wings between the timbers, which serve to divert the ore to chutes as it is broken. Every fifth set is usually maintained as an ore chute so that the wings need not span more than two timber sets. This makes it possible to keep the waste filling up to at least the second floor below that on which the men are working, an important consideration in the heavy ground encountered on the Mother Lode.

The wings are merely temporary sloping floors laid from one cap to the next above or below on either side along the stope, and extending to the ore chute. The men work on a few plank laid horizontally over the caps of the topmost timber set but instead of breaking ore down on a tight floor below and then shoveling and wheeling it to chutes it is broken on the wings which divert it to chutes without more labor. Varying and unusual conditions in the stopes make it necessary, of course, to do some shoveling but the men are required to reduce this to a minimum. The obstinacy of miners, who have been used to working in one other method for years, however, makes it hard to introduce new methods even with close supervision.

In easily mined ground where little shooting is required and sorting in the stopes is not advantageous this system works admirably. The saving effected by eliminating much shoveling and handling of rock in the stopes doubtless makes it possible to profitably mine ore which, under the old system of mining, had to be left. This scheme was introduced at the Argonaut by R. S. Rainsford, superintendent.

## Sand Filling on the Central Rand*

It has been determined that current tailings, as well as accumulated tailings, can be utilized in packing stopes and drives without any danger of cyanide poisoning of underground employees. Neutralization can be effected satisfactorily, and the filling in of worked-out sections of the Central Rand is now being done. In addition to the mines controlled by the Corner House, the Consolidated Goldfields properties, the Simmer & Jack, Robinson Deep and Knights Deep mines are to be filled with tailings.

### REMOVAL OF UNSIGHTLY DUMPS AND GREATER SECURITY IN THE MINES

The importance of the new practice and the extent of the far-reaching effect which will result therefrom have certainly not been fully appreciated by the public at large. In the first place, the removal of the unsightly dumps (which are assuming the proportion of small mountains) means that much valuable ground will be reclaimed and available for buildings, equipment, and employees' quarters.

Another important consideration is the improved security of underground workings, which will result from supporting the roof on closely packed sand. In many of the mines the condition of the hanging-wall is not altogether satisfactory, and in the interest of underground workers, a better system of safeguarding the miners against roof falls is demanded. The strongest timbers fail to resist the pressure of hundreds of feet of strata, and even some of the piles of waste rock which have been built up in the mine show signs of the enormous crushing strain to which they are subjected.

### LIFE OF MINE LENGTHENED

Pillars of solid undisturbed ground represent a satisfactory means of resisting pressure, provided that such pillars are of sufficient thickness and an adequate number of them is left. Such pillars represent ore in place, and while security of the workings is demanded, the

*South African Min. Journ., Apr. 30, 1910.

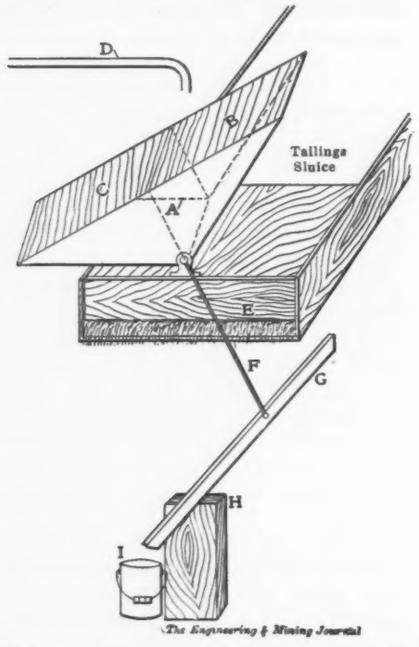
necessity for leaving a large tonnage of ore in the mine to support the roof naturally reduces the tonnage of ore available for milling.

In the past it has been common practice to allow about 20 per cent. of the total tonnage as not being recovered. The Witwatersrand banket beds are not greatly disturbed through faults, intrusions etc., and should not require more than about 10 per cent. for pillars when sand filling is employed. A 10-per cent. allowance would be ample for pillars, even in treacherous ground. This obviously means a large addition to the value and life of the mines.

## A Simple Automatic Sampler

BY ALGERNON DEL MAR*

The automatic sampler in the accompanying sketch is simple and easily made. The triangular prism *A* is of wood or tin, and divided into the compartments *B* and




TAILINGS SAMPLER AT BUNKER HILL MILL

*C*. It is pivoted above the tailings discharge *E*. The rod *F* is rigidly attached to *A* so it will move the slotted tin conveyer *G* back and forth across the stream of tailings. *G* is pivoted on the block *H* and discharges into the bucket *I*.

The operation of the machine is as follows: The jet of water which regulates the frequency of the samplings comes through the pipe *D*, and when one of the compartments *C* or *B* has filled sufficiently, it overbalances and swings the slot *G* across the whole width of the sluice, the sample running through to the bucket. It is now in position to be moved again in the opposite direction when the opposite compartment has filled enough to overbalance. By regulating the flow of water at *D* the time interval between samples may be regulated.

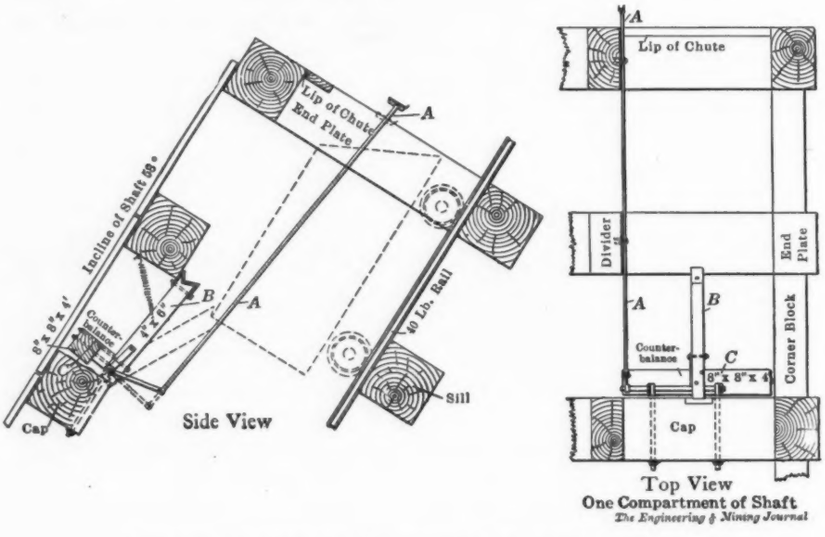
*Mining engineer, Los Angeles, Cal.

## Skip Chairs at Argonaut Mine

Few mines hoisting in skips use chairs in the shaft, but rather rely upon the engineer to stop near enough to the proper point for loading. In hoisting from depth the stretch or give of the hoisting cable is enough to cause considerable motion of the skip up and down the shaft, after stopping the hoist. Loading while the skip is in motion is bound to result in the spilling of a considerable amount of rock down the shaft. This is always dangerous and should be avoided.

In the Argonaut mine at Jackson, Amador county, Cal., Superintendent Ralph S. Rainsford has devised a simple type of skip chair which is shown in the accompanying illustration. At the loading station in the shaft there is a rod *A* connected by a shorter lever to the 4x6-in post. This piece is capped at its end with iron and acts as a buffer upon which the skip rests during loading, as is shown by the dotted lines. There is a counterbalance *C*, made of 8x8 material, connected to the buffer; this serves to swing the chair between the shaft timbers and clear of the skip, when not in use. As shown in the side view, a spring connecting the buffer and shaft wall plate is also used to assist in swinging the chair back. Where it is possible to use a sufficiently heavy counterbalance, the spring is unnecessary.

Skip chairs of this design are easily and cheaply constructed and placed in the shaft. Their use is certainly made worth while from the time saved in loading (not having to wait for the skip to come to rest) and the added security afforded men working at lower stations in the shaft.




SKIP CHAIRS USED IN ARGONAUT MINE, JACKSON, CAL.

## Electric Shot Firing

In the electric firing of high explosives, such as dynamite, the detonating agent generally used is the electric fuse. This consists of a copper shell containing the detonating charge which surrounds a bridge of fine platinum wire. The bridge joins the tips of two insulated copper wires, the ends of which are secured in the copper shell by a composition plug, also serving to keep the moisture away from the charge. When current is passed through the fuse the platinum bridge becomes heated to a temperature high enough to ignite the surrounding charge.

### DELAY FUSES

Delay-action fuses especially adapted for use in certain classes of tunnel or shaft excavation are so constructed that a short space of time intervenes between their ignition by the electric current and the detonation. First- and second-period delay-action fuses are on the market. When used in conjunction with regular electric fuses, the latter will detonate at the instant the current passes through the circuit, the first-period fuse will follow and the second-period fuses will detonate a little later.

The maximum breaking effect is secured with these fuses as one set of holes can be fired later than another. Insulated copper wire is used for connecting electric fuses. Leading wire, also insulated, but of larger size and hence presenting less resistance, is used to connect the first and last bore hole with the source of current.

### CURRENT FOR ELECTRIC FIRING

A blasting machine is commonly used to supply the current for electric firing, although this is sometimes taken from a power or lighting system. The machines are usually designed on the

same principle, although marketed in several sizes and styles. It is important that the lead wires and connections between fuses should be properly insulated. A leaky or broken circuit is sure to result in the misfire in some one or all of the bore holes, and this causes serious loss and delay. With the battery firer the fuses in the various bore holes must be connected in series.

A galvanometer may be used for testing the blasting circuit before firing. With this machine it is possible to determine leaks of any considerable extent or defects in the electric fuses; and to locate the point at which such trouble exists. A rheostat should be used from time to time to test the capacity of the blasting machines, so that they will not be overloaded. It is well to handle the lead wires on a reel so that they will not become twisted and tangled, and the insulation damaged.

With blasting powder or other similar low explosives, electric squibs may be used in place of the fuses. They are made on the same principle as the fuses but cost less, as a paper shell replaces the copper capsule of the fuse. The charge in the electric squib does not detonate, but burns or flashes, so that it can not be used to detonate dynamite, or other high explosive.

## Fast Drifting

Speeds as high as 60 ft. per week are obtained in crosscutting the slate formation in the Kennedy mine at Jackson, Cal. Three shifts are worked and two machines run on one bar. As soon as a round is fired, the bar is rigged horizontally across the face. Then, working on the muck, the two drillers put in the back, breast and cut holes. By the time these are in, the shovelers have cleaned up the muck pile enough to allow a lower setting of the bar from which the lifters are drilled.

In this manner no time is lost by the machine men in waiting for the muckers to clear away the rock from the face, and each man can put in his full shift at the work to which he is assigned. Such small refinements of methods amount to a great deal in the operating of a large mine and may represent the difference between a profitable or losing operation.

## Use for Worn Pins of Dredge Buckets

The worn bucket pins from the dredges of the Yuba Consolidated Goldfields Company, operating near Hammonton, Cal., are utilized to make cushion plates for use on the upper tumblers over which the bucket chains pass. The worn pins are forged into plates, roughly 8x10 in. and about 1 in. thick, through which two 1¼-in. holes are punched for bolts to fasten them to the tumblers. There is considerable wear on the upper tumblers from the impact of the buckets as they dump. The dirt and gravel caught between the bucket chain and face of the tumbler increase this wear. Placing the cushion plates on the tumblers serves to take up much of the force of the impact and to restrict the wear in a large measure to the plates, which can be renewed at much less cost of time than is necessitated when the tumblers must be replaced. The tumblers are heavy and hard to handle and changing them involves unlinking the bucket chain, and of course, tying up the dredge for several hours.

## Telescopic Gate for Cages*

In this type of gate, Fig. 1, a framework, *C D*, attached to the gate by ⅞-in. pins, *A B*, is constructed under the cage in such a manner that when the cage is lowered to the bottom of the shaft, the framework comes in contact with the chairs and lifts the gate, which gives access to the inside of the cage. The gate slides in slots provided at each side of the cage. When the cage is lifted, the gate by its own weight automatically closes itself.

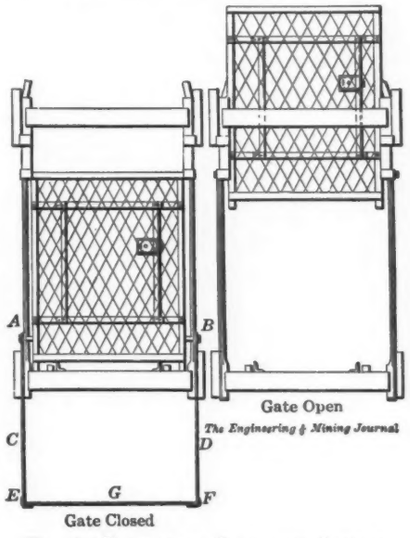



FIG. 1. TELESCOPE GATE FOR SINGLE DECK CAGE

At the station level the opening and closing of the gate is also automatic. A lever *K*, shown in Fig. 2, is pivoted at its center to the side of the cage, the lower end being attached to the bottom of the gate. When the cage ascends, the free end of the lever engages with a fixed sheave *L*, which depresses one end of the lever and lifts the gate attached to the opposite end. When the cage is lowered the gate automatically closes itself. The framework below the cage is constructed of flat iron bars *C* and *D*, Fig. 2, 2½x½ in., fixed rigidly together by bars *E* and *F* and by bars *G*, 2x¾ in., which insure the proper gage of the bars *C* and *D*.

The gate itself is made of an expanded-metal panel, in the center of which is a door just large enough for a man to pass through. This small door, which is constructed of flat iron bars 1½x⅜ in., opens inward on hinges, and is so hung as to close of its own accord. It is kept in this position by a self-closing latch, which locks into a flat iron bar, 1x½ in. The small door may, if preferred, be constructed in halves, so as to take up less room in the cage when opened.

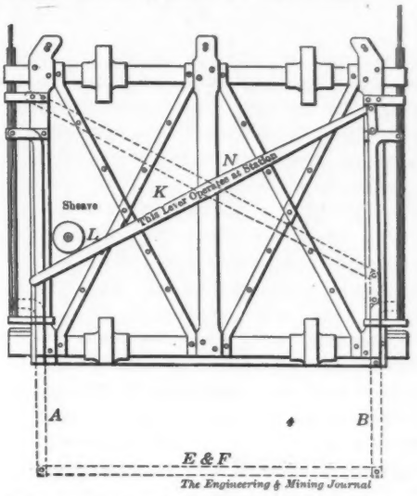
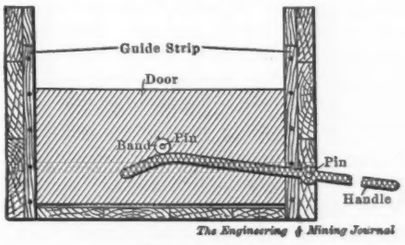



FIG. 2. WORKING LEVERS WHICH CLOSE GATE SHOWN IN FIG. 1

## Gate for Ore Chute

In both the Angels Quartz and Utica mines at Angels Camp, Cal., gates of the type shown in the accompanying sketch are used on ore chutes. The gate itself is a piece of sheet iron or steel, usually ¼ or ⅜ in. thick, sliding between strips of iron nailed to the sides of the chute. A piece of round drill steel is fixed to the gate, being riveted and countersunk on the inside and having an iron ring shrunk about it on the outside of the gate, thus serving to hold it firmly. A long iron bar, curved as shown, is pivoted on the side of the chute. In the Utica this is also a piece of drill steel and the bar may be slipped off at will.




CHUTE GATE

*C. A. Crofton. *Trans.* North of England Institute of Mining and Mechanical Engineers.

# Accuracy of Mechanical and Riffle Ore Samplers

## Requirements for Mechanical Ore Samplers. Cause of Inaccurate Results with Riffles. Wet Screen Tests Preferable to Dry Screen Tests

BY LOUIS D. HUNTOON*

An article by Thomas Kiddie in the JOURNAL, Oct. 23, 1909, criticizes the Jones riffle sampler, and expresses the opinion that the accuracy of all sampling machines should be determined by a commission or by the faculty of some school of mines. Manufacturers can afford to have their machines thoroughly tested by mining schools equipped to do such work or by sampling and ore-testing plants. If the machine answers all of the requirements placed upon it, it will then have an indorsement which should facilitate the sale of that particular sampler. A machine so indorsed will not of necessity give an accurate sample unless it is properly installed and the relation of the weight of the sample to the diameter of the largest grain is considered. I have seen a Vezin sampler revolving against the stream of ore instead of revolving with it, with a speed equal to the trajectory of the falling grains.

### MECHANICAL SAMPLERS

The type selected will depend on the cost, available floor space, head room required, size of ore, and the tonnage to be sampled. There are mechanical samplers on the market which will give accurate results and others which are worthless. Unless the purchaser is conversant with the requirements of samplers he is just as liable to select a poor one as a good one.

Mechanical samplers are of two general classes: The first takes a portion of the stream all of the time and the second takes all of the stream a portion of the time. If one studies a stream of ore, it will be noticed that although the ore is thoroughly mixed when entering the chute, it soon separates, the coarser sizes finding their way to the sides and surface of the stream and the fines going to the bottom. It is impossible to cut a longitudinal section, from the discharge of such a stream, which represents the average content, as the valuable minerals are not evenly distributed across the stream. Most samplers which take a portion of the stream all the time are of this type.

The second method of taking a portion of the stream all of the time is to place the sampler at right angles to the flow of the stream. The sample from such an arrangement cannot be an average of the ore, as only one size is selected; the coarse material will go beyond the sampler and the fine material will fall short of it. A mechanical sampler taking part of the stream all of the time must come under one of the above heads, and the resulting sample cannot be accurate.

### MECHANICAL SAMPLER REQUIREMENTS

The requirements for an accurate mechanical sampler are:

(1) All of the stream of ore must be taken a portion of the time. (2) The same percentage of ore must be taken from all sections of the stream. (3) The stream of ore delivered to the sampler must be constant. (4) The cut should be taken as frequently as possible. (5) The size of the ore should be reduced between each sampling. (6) The construction of the machine should be simple, and such that it can be readily cleaned. (7) The sample should contain by screen test the same percentage of sizes and contents in each size as the original ore. A mechanical sampler fulfilling the first six requirements should fulfil the seventh.

### ERRORS IN SAMPLING

Most of the errors occurring in sampling are in the final reduction of the sample. Here the personal element enters and the resulting pulp may or may not be correct. One large mine which I visited contained a most complete mechanical sampling department. The mill superintendent complained that the public chemists and assayers could not make an accurate determination of the ore. Original and duplicate samples of the tailings would vary from 0.1 to 1 per cent. of base metal. It was found upon investigating that the sample obtained from the mechanical sampling plant was carelessly riffled over flat-bottomed riffles. The riffles were overloaded, resulting in a larger percentage of coarse material entering sample *A* and an excess amount of fines entering sample *B*. The superintendent was advised to install Jones riffles, which cannot be overloaded, and to crush between each riffling.

Two other sources of error are in the scoop used. This should be the full width of the riffles. The edge of the scoop after using for some time will roll back, retaining a small percentage of fine ore which should be discharged to the riffles. The two common methods of reducing the weight of the sample obtained

TABLE 1. DRY SCREEN TEST WITH 12 RIFFLES.

| Size. | Number. | Sample A, Weight. Grams. | Per Cent. | Number. | Sample B, Weight. Grams. | Per Cent. | Total Weight, Grams. | Per Cent. |
|---|---|---|---|---|---|---|---|---|
| ½–¼ | 1 | 2,520 | 20.259 | 7 | 2,490 | 19.973 | 5,010 | 20.116 |
| ¼–⅛ | 2 | 4,290 | 34.489 | 8 | 4,320 | 34.651 | 8,610 | 34.570 |
| ⅛–10 | 3 | 735 | 5.909 | 9 | 734 | 5.888 | 1,469 | 5.898 |
| 10–40 | 4 | 3,060 | 24.600 | 10 | 3,080 | 24.705 | 6,140 | 24.653 |
| 40–80 | 5 | 894 | 7.187 | 11 | 890 | 7.139 | 1,784 | 7.163 |
| 80–0 | 6 | 940 | 7.556 | 12 | 953 | 7.644 | 1,893 | 7.600 |
| Total... | | 12,439 | 100.000 | | 12,467 | 100.000 | 24,906 | 100.000 |

TABLE 2. DRY SCREEN TEST WITH 9 RIFFLES.

| Size. | Number. | Sample C, Weight. Grams. | Per Cent. | Number. | Sample D, Weight. Grams. | Per Cent. | Total Weight. Grams. | Per Cent. |
|---|---|---|---|---|---|---|---|---|
| ½–¼ | 13 | 2,513 | 21.287 | 19 | 2,972 | 22.715 | 5,485 | 22.038 |
| ¼–⅛ | 14 | 4,036 | 34.189 | 20 | 4,480 | 34.240 | 8,516 | 34.216 |
| ⅛–10 | 15 | 490 | 4.151 | 21 | 620 | 4.739 | 1,110 | 4.459 |
| 10–40 | 16 | 3,028 | 25.650 | 22 | 3,057 | 23.364 | 6,085 | 24.449 |
| 40–80 | 17 | 838 | 7.099 | 23 | 989 | 7.559 | 1,827 | 7.341 |
| 80–0 | 18 | 900 | 7.624 | 24 | 966 | 7.383 | 1,866 | 7.497 |
| Total... | | 11,805 | 100.000 | | 13,084 | 100.000 | 26,889 | 100.000 |

TABLE 3. DRY SCREEN TEST WITH 8 FULL AND 2 HALF RIFFLES.

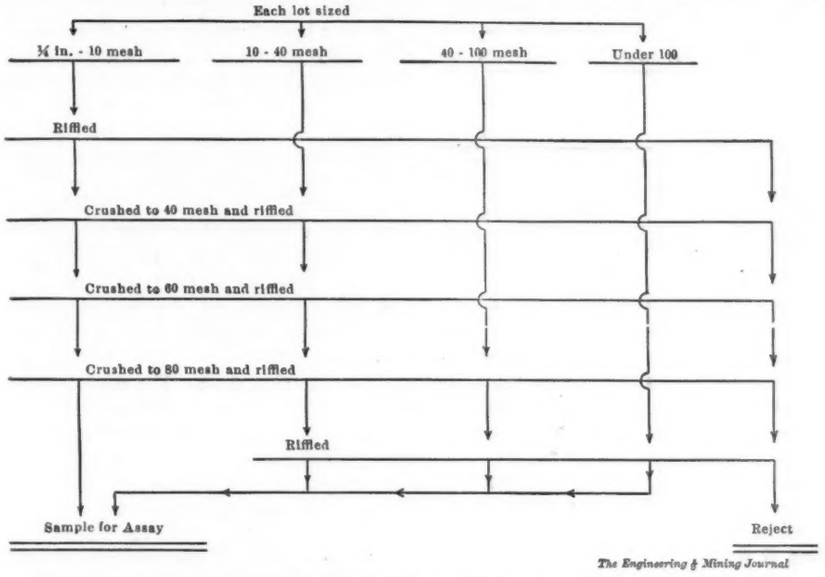
| Size. | Number. | Sample E, Weight. Grams. | Per Cent. | Number. | Sample F, Weight. Grams. | Per Cent. | Total Weight. Grams. | Per Cent. |
|---|---|---|---|---|---|---|---|---|
| ½–¼ | 25 | 2,890 | 23.288 | 31 | 2,710 | 21.783 | 5,600 | 25.534 |
| ¼–⅛ | 26 | 4,380 | 35.294 | 32 | 4,300 | 34.563 | 8,680 | 34.928 |
| ⅛–10 | 27 | 435 | 3.505 | 33 | 563 | 4.525 | 998 | 4.016 |
| 10–40 | 28 | 2,880 | 23.207 | 34 | 3,055 | 24.556 | 5,935 | 23.882 |
| 40–80 | 29 | 905 | 7.292 | 35 | 930 | 7.475 | 1,835 | 7.384 |
| 80–0 | 30 | 920 | 7.414 | 36 | 883 | 7.098 | 1,803 | 7.256 |
| Total... | | 12,410 | 100.000 | | 12,441 | 100.000 | 24,851 | 100.000 |

*Professor of mining and metallurgy, Sheffield Scientific School, New Haven, Conn.

from the mechanical sampler are coning and quartering, and riffling. Coning and quartering is rarely used and is to be deprecated. The most accurate method is by riffling, paying careful attention to the proper size of ore for the weight of the sample.

### Riffle Samplers

The riffle samplers are divided into two classes: (1) Those having flat bottoms to every alternate section, the balance of the sections being open; and (2) those of the Jones type, having inclined bottoms, the alternate sections of which discharge into pan *A* and the balance into pan *B*. The latter type, of which there are several modifications, is preferable, especially with larger samples. The riffle samplers of both classes should have an even number of divisions and the width of the sampler will depend upon the weight of the sample. The president of a large Western supply house told me that some manufacturers are selling riffle samplers with an uneven number of riffles. Such dividers cannot give an average sample, as the following tests will show.




Flow Sheet Showing Screen Tests and Sampling

### Accuracy of Jones Riffle Samplers

To prove the accuracy of Jones riffle samplers a series of tests have been made under different conditions, using even and odd numbers of riffles and making both wet and dry screen-tests. When the sampler is properly used the original and duplicate samples check in every respect.

The first set of three tests was made on ores containing about 20 per cent. pyrite for the purpose of comparing the weights of the different sizes from screen tests. The variations in the tests were in the use of the riffles. The results from these preliminary tests (Tables 1, 2 and 3) were satisfactory for dry screening.

The method of conducting the second set of tests (Tables 4, 5, 6, 7 and 8) was determined upon from the results of the first set. Cripple Creek ore was selected as being a difficult ore from which to secure an average sample, the fines from which would assay much higher than the original ore. If duplicate samples can be obtained from this ore, checking in every respect, there should be no difficulty in sampling any other ore by means of riffling when crushed to the proper size.

*Test No.* 1—The results of test No. 1, made on 25 kg. of pyritic ore passing ½-in. round hole, are given in table 1. The scoop used in feeding the ore to the Jones riffles (exactly the same width of the riffles) was filled from the pile of ore and discharged over the entire width of the riffles. When the ore is fed under this condition the weight should be equally divided between lots *A* and *B*. The loss in total weight in sampling amounted to 94 grams or 0.37 per cent. The two samples, *A* and *B*, were sized dry. The difference in weight of the two samples is 28 grams or 0.11 per cent. of the original weight. The greatest difference between corresponding sizes is 0.286 per cent., samples Nos. 1 and 7. Such slight differences can readily be accounted for by the personal element entering into the thoroughness with which the screening is done.

TABLE 4. DRY SCREEN TEST AND ASSAY OF SIZES; 12 RIFFLES.

| | Sample I. | | | | | Sample J. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Weight. | | Assay. | | | Weight. | | Assay. | |
| Size. | No. | Grams. | Per Cent. | $ | Per Cent. | No. | Grams. | Per Cent. | $ | Per Cent. |
| ¼–10 | 37 | 936 | 37.50 | 16.40 | 22.46 | 41 | 936 | 37.51 | 16.40 | 22.52 |
| 10–40 | 38 | 909 | 36.34 | 22.00 | 29.19 | 42 | 909 | 36.44 | 22.00 | 29.34 |
| 40–100 | 39 | 345 | 13.80 | 37.20 | 18.74 | 43 | 341 | 13.67 | 36.60 | 18.41 |
| 100–0 | 40 | 309 | 12.36 | 65.60 | 29.61 | 44 | 309 | 12.38 | 65.60 | 29.73 |
| Total.... | | 2,499 | 100.00 | 27.39 | 100.00 | | 2,495 | 100.00 | 27.32 | 100.00 |

*Test No.* 2—The object of test No. 2 was to determine how an uneven number of riffles would affect the weights and sizes. A special scoop was made, nine riffles wide, and the ore from the previous test was fed so that four riffles discharged to *C* and five riffles to *D* (Table 2).

In shoveling ore the coarse material tends to roll toward the sides, and it was expected that the two outside riffles, discharging to *D*, would contain a larger percentage of coarse ore than the inside riffles. Examining the results in Table No. 2, sample No. 19, ½ to ¼ in., contains 459 grams, or 1.4 per cent. more ore than the corresponding sample No. 13. Comparing the total weights of lots *C* and *D*, lot *D* contains 1279 grams, or about 5 per cent. more ore than lot *C*. The riffles were not properly used and the results do not check.

TABLE 5. WET SCREEN TEST AND ASSAY OF SIZES; 12 RIFFLES.

| | Sample K. | | | | | Sample L. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Weight. | | Assay. | | | Weight. | | Assay. | |
| Size. | No. | Grams. | Per Cent. | $ | Per Cent. | No. | Grams. | Per Cent. | $ | Per Cent. |
| ¼–10 | 45 | 896 | 35.86 | 14.40 | 18.41 | 49 | 896 | 35.86 | 14.40 | 18.41 |
| 10–40 | 46 | 712 | 28.50 | 18.80 | 19.11 | 50 | 712 | 28.50 | 18.80 | 19.11 |
| 40–100 | 47 | 318 | 12.70 | 29.60 | 13.40 | 51 | 318 | 12.70 | 29.60 | 13.40 |
| 100–0 | 48 | 572 | 22.94 | 60.00 | 49.08 | 52 | 572 | 22.94 | 60.00 | 49.08 |
| Total.... | | 2,498 | 100.00 | 28.05 | 100.00 | | 2,498 | 100.00 | 28.05 | 100.00 |

*Test No.* 3—A case might arise where the scoop to be used is not the full width of the riffles, and the third test was to determine if duplicate samples could be made to check under this condition. The scoop used was the one made for test No. 2. The standard Jones riffle containing twelve divisions was used. The scoop was discharged over eight full and two half divisions, which should give accurate results, as 4½ sections are discharged respectively into *E* and *F* (Table 3). The greater the number of riffles, or sections

of ore entering the sample, the greater the accuracy. A 12-riffle sample should give better results than a nine-riffle sample. Examining the results of this test, I found a difference in the total weights of 31 grams, or 0.124 per cent., which practically checks the results of test No. 1.

After finding that the total weights of *E* and *F* checked, the screen tests were run hurriedly to determine the discrepancies from poor screening. It will be noticed that the weights of the different sizes do not agree.

Comparing the assays, we find the total assays of the duplicate samples *I* and *J* check within 6.56c. and the assays of corresponding sizes check with the exception of samples No. 39 and No. 43, where there is a difference of 60c. The checking of duplicate dry screen tests, such as the above, is due to thorough screening.

Examining table 5, which is the duplicate of table 4 with the exception that the screen tests were conducted wet, I find: Original weight, 5000 grams; weight of samples *K* and *L*, 4996 grams; loss in weight, 4 grams, or 0.08 per cent. The duplicate assays of *K* and *L* check in every respect.

TABLE 6. DRY SCREEN TEST AND ASSAY OF SIZES; 9 RIFFLES.

| | Sample O. | | | | | Sample P. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Weight. | | Assay. | | | Weight. | | Assay. | |
| Size. | No. | Grams. | Per Cent. | $ | Per Cent. | No. | Grams. | Per Cent. | $ | Per Cnet. |
| ¼–10 | 53 | 940 | 38.2 | 19.10 | 24.0 | 57 | 1,045 | 41.1 | 17.60 | 26.7 |
| 10–40 | 54 | 956 | 38.9 | 28.20 | 26.0 | 58 | 955 | 37.6 | 24.00 | 33.4 |
| 40–100 | 55 | 278 | 11.3 | 40.00 | 14.8 | 59 | 271 | 10.7 | 37.20 | 14.7 |
| 100–0 | 56 | 286 | 11.6 | 66.00 | 2.52 | 60 | 269 | 10.6 | 64.00 | 25.2 |
| Total.... | | 2,460 | 100.0 | 30.44 | 100.0 | | 2,540 | 100.0 | 27.01 | 100.0 |

From the above tests it will be seen that so far as the total weights and the percentages of the different sizes are concerned the Jones riffle sampler will give accurate results when properly used. Chemical tests were not made, as it was considered advisable to take a more difficult ore and compare wet and dry screen tests.

### Riffle Tests on Cripple Creek Ore

The second set of tests, on two different lots of Cripple Creek ore, were run in duplicate over 12 and nine riffles and the screen tests conducted both wet and dry. The results of the 12-riffle tests are given in tables 4 and 5, and the nine-riffle tests in tables 6 and 7.

Each original lot of ore was sampled into four portions by riffling. Screen tests were made on each lot and the sized products were crushed and sampled by riffling, as shown in the accompanying flow sheet. Before the final assay samples were obtained, sizes ¼ in. to 10 mesh were each riffled four times; 10 to 40 mesh, three times; 40 to 100 mesh and below 100 mesh, each once, making a total, together with the preliminary sampling, of 11 rifflings on each lot. All assays were made in duplicate on charges of ½ a.t. of pulp.

Duplicate samples in tables 4 and 5 show the difference between dry and wet screen tests using 12 riffles. Examining table 4, dry screen test, I find the following: Original weight, 5000 grams; weight of samples *I* and *J*, 4994 grams; loss in weight 6 grams, or 0.12 per cent., which loss is probably due to dust in screening. The total weights of the duplicate samples *I* and *J* check within 4 grams or less than 0.17 per cent. The weights of the corresponding sizes check with the exception of No. 39 and No. 43, where there is a difference of only 0.13 per cent.

### The Use of Odd Number of Riffles

The third set of tests was made to determine the difference in weight and assay of the original and duplicate samples when an uneven number of riffles are used. A second portion of Cripple Creek ore was selected and riffled into lots No. 6 and No. 7. These were again riffled into two samples, using nine riffles; samples *O* and *Q*, containing four riffles and *P* and *R* five riffles each. Both wet and dry screen tests were made. The results from the dry screen test, using nine riffles, are given in Table 6. The weight of the original sample, 5000 grams, is checked by the sum of the weights of samples *O* and *P*. Sample *O*, the discharge from four riffles, contains 49.2 per cent. of the original weight and 52 per cent. of the total gold content, indicating that a greater proportion of coarse material entered the five-riffle sample. An examination of the table verifies this.

The results of the wet screen test, using nine riffles, are given in Table 7. The weight of the original sample is checked by the sum of the weights of samples *Q* and *R*. Sample *Q*, the discharge from the four riffles, contains 48.8 per cent. of the original weight and 51 per cent. of the total metal content.

### Accuracy of Flat Bottom Riffles

To test the accuracy of flat-bottomed riffles, 12 lb. of Cripple Creek ore were crushed to 10 mesh and riffled into original and duplicate samples, crushing between each riffling. The original pulp sample contained the portions which remained in the riffle after each sampling, and the duplicate sample the portions which went through after each sampling. If there had been any difference between the portion contained in the riffles and that which went through, the error would have been multiplied eight times, as each sample was riffled four times. Duplicate assays were run on each pulp.

### Wet vs. Dry Screen Tests

Screen tests may be run either wet or dry. Dry screen tests are most unsatisfactory, and one should not expect the different sizes from duplicate tests to check exactly. There will always be more or less dust attached to the larger grains and the percentage will depend upon the thoroughness with which the screening is done. The different sizes from wet screen tests on the same ore should check both in weight and assay.

A comparison of the corresponding sizes on tables 4 and 5, and tables 6 and 7 is most interesting in showing the effect of adhering dust. The per cent. of weights and the assay contents in the coarser sizes of the dry-screen tests are all higher than the corresponding sizes of the wet-screen tests. The per cent. of weights and contents in the ore finer than 100 mesh is higher and the value per ton of ore is lower in the wet-screen tests than in the dry-screen tests.

Comparing the weights of samples No. 40 and No. 48 we find but 12.36 per cent. of the ore is finer than 100 mesh in the dry-screen test, whereas in the wet-screen test 22.94 per cent. is finer. Comparing samples Nos. 56 and 64, the dry-screen test contains 11.6 per cent. and the wet-screen test contains 21.5 per cent. finer than 100 mesh. Sample No. 60 dry-screen test contains 10.6 per cent. and the corresponding sample of the wet-screen test, No. 68, contains 21.3 per cent. finer than 100 mesh.

Comparing the percentage of total values, we find sample No. 40, dry-screen test, contains 29.61 per cent. and the corresponding sample No. 48, wet-screen test, contains 49.08 per cent.; sample No. 56, dry-screen test, 25.2 per cent., and

TABLE 7. WET SCREEN TEST AND ASSAY OF SIZES; 9 RIFFLES.

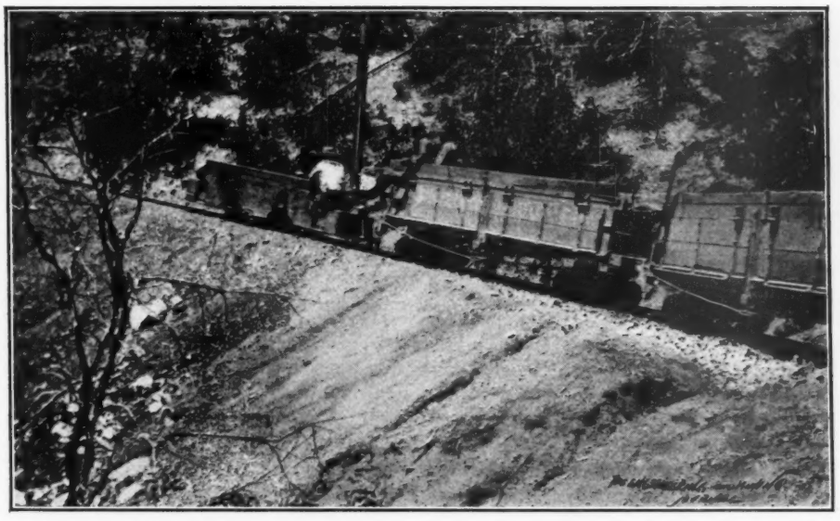
| | Sample Q. | | | | | Sample R. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Weight. | | Assay. | | | Weight. | | Assay. | |
| Size. | No. | Grams. | Per Cent. | $ | Per Cent. | No. | Grams. | Per Cent. | $ | Per Cent. |
| ¼–10 | 61 | 900 | 36.9 | 17.00 | 21.4 | 65 | 964 | 37.7 | 12.40 | 17.5 |
| 10–40 | 62 | 776 | 31.8 | 21.13 | 23.0 | 66 | 805 | 31.4 | 19.20 | 22.5 |
| 40–100 | 63 | 239 | 9.8 | 35.60 | 11.9 | 67 | 246 | 9.6 | 36.80 | 13.3 |
| 100–0 | 64 | 525 | 21.5 | 59.40 | 43.7 | 68 | 545 | 21.3 | 58.40 | 46.7 |
| Total.... | | 2,440 | 100.0 | 29.25 | 100.0 | | 2,560 | 100.0 | 26.66 | 100.0 |

the corresponding sample No. 64, 43.7 per cent., sample No. 60, dry-screen test, 25.2 per cent., and the corresponding sample No. 68, 46.7 per cent.

Comparing the assays per ton of the ore finer than 100 mesh, we find the wet-screen tests lower than the dry-screen tests in every case. This is readily accounted for by the fact that the slimes from Cripple Creek ores are lower grade than the fine sands under 100 mesh. In the dry-screen tests the percentage of sands in the ore under 100 mesh is greater than in the wet-screen tests.

TABLE 8. COMPUTED ASSAYS.

| Sample M. | | | | Sample N. | | | |
|---|---|---|---|---|---|---|---|
| No. | Weight. | Assay. | Gram-Assay. | No. | Weight. | Assay. | Gram-Assay. |
| O | 2,460 | 30.44 | 7,490 | Q | 2,440 | 29.25 | 7,137 |
| P | 2,540 | 27.01 | 6,858 | R | 2,560 | 26.66 | 6,825 |
| M | 5,000 | 28.69 | 14,348 | N | 5,000 | 27.92 | 13,962 |



ELECTRIC LOCOMOTIVE OPERATING ON A 12 PER CENT. GRADE IN CALIFORNIA

### SUMMATION

From the above we find that errors in sampling are either due to mechanical samplers not taking an average sample or else to carelessness in the final reduction of the sample for assay. Riffle samplers, when containing an equal and sufficient number of divisions, will give average samples when properly used. Wet-screen tests should be made when one desires to find the percentage of weights and the metal contents in the different sizes from a lot of ore.

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The Paradise Valley Railway has been incorporated in Salt Lake City. J. G. Jacobs is at the head and R. E. Tilden, engineer. The road is to be standard gage and will run from Winnemucca, Nev., to ward the town of Paradise Valley through a rich farming country, and then to National and McDermitt.

## Electric Locomotives on Heavy Grades

The operation of electrical apparatus under severe conditions is illustrated by the installation at Holt & Gregg's lime quarry at Kennett, Shasta county, California. This quarry is near the copper mines and smeltery of the Mammoth Copper Mining Company, and supplies the limestone flux. The quarry is two miles from the station where the rock is stored for the smelting company and about 2000 ft. above the ore bins.

In order to transport the rock to this point a road was built around two mountains, necessitating many curves and heavy grades. There are 35 curves with radii varying from 35 to 55 ft. The entire road has heavy grades, varying from 4 to 12 per cent., the average being about 7 per cent. This road was originally laid out as a wagon road, but was afterward changed into a 30-in. gage mule tramway, equipped with 30-lb. rails.

### EQUIPMENT

The demand for limestone became so great that it was not possible to supply it with this equipment. An electric locomotive was purchased and a new system put into operation. The locomotive handles three-car trains, each car weighing 4400 lb., empty. The wooden body is mounted on substantial double trucks, having a 3-ft. wheelbase. A complete braking equipment was provided consisting of both track and wheel brakes. The locomotive had a rating of 11 tons, and was equipped with two 42-h.p., 550-volt motors.

On account of heavy grades and consequent wear of the wheels by the brakes, the locomotives were equipped with track brakes in addition to the standard wheel brakes. This track brake consists of a steel shoe or slipper, mounted under each side frame at the middle point of the wheel base. This shoe can be applied to the rails with heavy presure by means of a screw and nut mechanism at the operating end of the locomotive. By their use the wear is confined to a simple and readily renewable casting.

Three locomotives are in use and a switching system has been installed, so that two locomotives can travel back and forth, each making about 10 trips during the day.

### POWER STATION

Owing to the mountainous country, it was necessary to install the power station at the end of the line. The equipment at present consists of a 60-kw. and 150-kw. motor generator set, both compounded for 550 to 575 volts, the two being operated in parallel. Owing to the long haul over this road, the motor generator sets are operating under continuous overload of about 25 per cent. Up to the present time they have apparently suffered no injury from this severe service. The complete equipment was furnished by the General Electric Company.

## Natural Gas and Petroleum near Fayette, Ala.

The existence of natural gas has been known for more than a year, in a small area three miles east of Fayette, Ala. This region was recently visited by David T. Day, of the U. S. Geological Survey, who reports that four wells have been drilled, showing gas with a pressure estimated at 600 lb. per sq.in. Nine additional wells are in process of drilling.

The gas is found at a depth of 1400 ft. in a close-grained sandstone, estimated by the Providence Oil and Gas Company to be 50 ft. thick. Small quantities of crude petroleum similar to that usually found in the Appalachian region were encountered at various depths above the gas. The strata pierced in the drilling consist of alternating layers of shale, sandstone, and tight, sticky clay. It is estimated that 5,000,000 cu.ft. of gas per day can be furnished from the four wells now completed. The gas is pure and free from sulphur.

### DEVELOPMENT WORK BEING DONE

The conditions for successful gas wells are ideal, but it is impossible to determine how far these conditions may ex-

tend without interruption by faults or other disturbance of the impervious cover. The thickness of the gas-bearing stratum and the pressure developed indicate a satisfactory yield of gas as compared with other known gasfields. The amount of development work thus far done is not sufficient to show whether a supply adequate to the needs of Birmingham for domestic and manufacturing purposes can be obtained. This will be determined by the completion of the wells now drilling.

## Notes from the Moctezuma District of Sonora

SPECIAL CORRESPONDENCE

Preparations are being made at the 2000-ton concentrating plant of the Moctezuma Copper Company, at Nacozari, to install an aërial tram to carry the tailing to a storage pond above the river flood level where they will be impounded for future treatment. This will also result in less contamination of the water flowing to the ranches at Cumpas and lower points. The Traylor Engineering Company is reported to have obtained a contract for a dewatering device to be placed at the head of the tramway. One unit of a filter press is being installed to save floating sulphides which have been the cause of considerable loss. The plant has suffered from lack of water and but one of the two units is now in operation.

The Churunibabi mine of the Moctezuma Copper Company, which has been productive of several thousand tons of converter lining under the management of F. Field during the last year, has been closed for the present.

William Kirk is now shipping copper ore from the Bella Union mine of the Moctezuma Copper Company. This ore consists of oxides and native copper and the last shipment is reported to have carried 39 per cent. copper, with a little gold and silver.

The San Pedro mine of the Moctezuma Copper Company is being worked on company account. This has been under lease to J. G. Alexander and associates for two years.

The Tharsis-York company, operating near the Pilares mine, has closed down awaiting the installation of machinery to handle the flow of water recently struck. C. F. Nourse, of Nacozari, is superintendent.

J. G. Alexander reports the tunnel on the Nacozari Consolidated Copper Company as nearing the vein below the old workings on La Galera claim. This tunnel is now in about 600 ft. and is projected for about 3000 ft., which will bring it under the copper showings on the Copper King as well as opening up the Beatriz claim of the Tharsis-York company.

The Los Angeles mine of the Arizona Mining and Trading Company, which has been in litigation for some time, is again working and has shipped one car of ore to Douglas smelters. E. O. Wolf, of Douglas, is manager.

At the Mexicana mine, lately acquired by Amarillo San A. Terrazas, of Chihuahua from David Rosas and associates, a strike of 5 ft. of high-grade gold-silver ore is reported. A mill to equip this property is in view. The ore is amenable to amalgamation and cyanidation.

R. Vion, of the San Jose company, is in Paris arranging the company's affairs in view of a transfer of the mines and mill at Nacozari. The properties embrace about 175 acres and include a pumping plant, 10-stamp mill and cyanide tanks. Several thousand tons of milling ore are now blocked out and some high-grade is being shipped from time to time by Macario Alatorre under lease in the old workings.

At El Globo mine, the 1600-ft. crosscut tunnel is reported to be in ore showing free gold in considerable quantity. This tunnel taps the ledge at about 1000 ft. from the surface and 700 ft. below the deepest old workings which were reported exhausted. The property is equipped with a 15-stamp mill, 2 Wilfley tables, vanner, plates and cyanide tanks. C. A. Romadka, of Douglas, Ariz., is mine manager.

The Dawson Mining Company has been placed in the hands of a receiver by the courts at Moctezuma. This property has been in litigation for about a year, and while it showed sufficient merit to attract the attention of Eastern capital, the unsettled condition of the company affairs has resulted in stopping any decisive action. Dr. O. B. Dawson, of El Paso, Tex., was president of the old company.

At the La Caridad mine of the Minaret Mines Company, of Los Angeles, operations have been suspended and a watchman placed in charge of the property. At El Aguaje mine of the Silver Seal Company, of Los Angeles, the workings are being dewatered pending the arrival of engineers expected to make an examination for a sale. F. O. Colson, of Nacozari, is in charge.

On the Don Carlos mine, near Nacozari, Harry Duey, of Douglas, Ariz., is installing a headframe and gasolene hoist to work at greater depth. In the shaft at about 70 ft. depth, a small vein of ore has been broken into, running high in silver and about 33 per cent. copper. This mine has been productive of considerable high-grade ore below the old stopes, but no systematic development work had been attempted until the mine was recently acquired by Mr. Duey and associates.

The Silver King mine, of the Day and Night Company, is reported to be under option to Kansas City men for $50,000. This property has been idle for some time.

W. J. Martell has been appointed mine manager at the Esperanza mine of the Montenegro company, *vice* Hunter Lepaige, resigned. Operations at the property are confined to development work on the Esperanza and Constancia claims. The latter was recently taken over on option from A. Llewels, and the new owners report a strike of 4 ft. of gold-silver-lead-copper ore in the shaft. The property is in the Barrigon district, about 7 miles west of Nacozari.

IN THE TABOTACACHI SECTION

The Silver Tiger Mining Company, of Kansas City, represented by E. J. White, is continuing development work on the Crede Liberal mine, in the Tabotacachi district. Some ore has been struck, but the vein is as yet too broken to permit any definite conclusions. Nicolas Bartolini is shipping regularly from the San Ignacio and El Olvido mines. These properties have been productive of ore for the last three years under this management.

George J. Cole, of El Paso, reports encouraging developments on his Armagosa claim, and it is thought that a small concentrator will be installed in the near future.

The Antiguo and Texas mines in the Tabotacachi district, 25 miles east of Nacozari, in charge of H. C. Carr, have installed a new pipe line to replace the one first put in, which proved to be inefficient. The properties are equipped with machinery and headframes, and houses have been built to accommodate a considerable force of men. About 20 men are reported to be at work in the Antiguo, and some ore is being taken out in development work. Mr. Carr is also pushing development at the El Temblor mine in the El Tigre district, for which the balance of the $50,000 price was paid a few days ago, in Cananea. In the Temblor rich ore is reported to have been struck and shipments are expected to start soon.

## Crown Reserve to Ship Silver Ore to Germany

The Crown Reserve company, of Cobalt, Ont., has completed arrangements with the German government to ship to Germany a consignment of the high-grade ore containing approximately 1,000,000 oz. of silver.

This will be used in combination with some of the low-grade ores from Saxony, and will be treated in the Government smeltery. The shipments will assay about 4000 oz. per ton and the contract calls for delivery within a year. It is estimated that eight carloads of ore will be required.

# Silver Cyaniding at the San Rafael Mill, Pachuca

## Extraction 92.11 Per Cent. of the Silver and 97.09 Per Cent. of the Gold at a Milling Cost of 3.847 Pesos. Distribution of Costs

BY E. GIRAULT*

The San Rafael cyanide mill, built in 1908, belongs to the type introduced the year before in the San Francisco *hacienda* by A. Grothe. The ores from the San Rafael mines, derived from the Vizcaina vein (the mother lode of the district), contain from 70 to 75 p : cent. silica, and from 10 to 20 per cent. of calcite. The silver is found mostly as $Ag_2S$, mixed with a small amount of base sulphides. The gold occurs in a nearly constant proportion of 4 to 5 grams per kilogram of silver in the low-grade ore, and 3 to 4 grams per kilogram of silver in the high-grade ores. All ores above 300 grams of silver per ton are cyanided.

### Treatment

The ore is hand picked, crushed in Blake crushers, and sampled in the mine yard. It is further crushed in cyanide solution in stamp batteries and concentrated on Wilfley tables, then classified in Dorr classifiers and the oversize reground in Krupp tube mills, the products settled in Dorr pulp thickeners and agitated in Pachuca pneumatic tanks. The solutions are filtered in Moore vacuum filters and precipitated on zinc shavings.

The mill is driven by electric power, with motors of the Westinghouse, C. C. L. type. Each battery of 20 stamps has a 75-h.p. motor; each Krupp tube mill, one of 100 h.p. The total power consumption per ton of ore is 1.68 h.p. per day. The water supply is drawn from the mine and is slightly alkaline.

There are 80 stamps in use; 40 Krupp, weighing 850 lb. set on timber foundation, and 40 Allis-Chalmers of 1250 lb., bolted to concrete foundations. The light stamps drop 7¾ in. and the heavy ones 6¾ in., 104 times per minute. The shoes and dies of forged steel last from 90 to 100 days. On the mortars are Tyler's screens, Nos. 58 and 365, equivalent to 10-mesh, 18-wire, 1.32-mm. opening and to 12-mesh, 20-wire, 1.067-mm. respectively. The 850-lb. stamps crush from 3 to 3½ tons per day through 10 mesh. The 1250-lb. stamps from 6 to 6½ tons through 10-mesh; and from 5½ to 6 tons through 12-mesh. From seven to eight tons of solution to one of ore is used in the batteries.

With 10-mesh screens, the capacity of the batteries is 400 tons per day; but at present, crushing is limited to 350 tons to avoid overloading of the tube mills. One pair of spring rolls, 36x16 in., and two more tube mills have been ordered; when installed, 8-mesh screens will be used with the expectation of raising the crushing to about 500 tons per day.

The following is a sizing test of the battery pulp, No. 58 (10-mesh) screens being used: Over 40 mesh, 37 per cent.; over 60 mesh, 9 per cent.; over 100 mesh, 7 per cent.; over 150 mesh, 13 per cent.; over 200 mesh, 4 per cent.; under 200 mesh, 30 per cent.

### Mill Solution and Cyanide Consumption

The mill solution is stored in two tanks of 200 cu.m. each; these tanks are used alternately to supply the mill, and to receive the barren solution, being worked in cycles in order to avoid the enrichment of the solution. According to the class of ore treated, from six to 12 kg. of lime are added in the bins per ton of ore. The alkalinity of the solutions is kept at one kilogram of CaO to the ton. The mill solution averages 0.25 per cent. of KCN; the cyanide consumption in crushing is about 600 grams to the metric ton of ore.

The extraction in the grinding process is high, averaging during October, 1909, 38.3 per cent. of the silver and 70 per cent. of the gold contained in the ore.

Sixteen Wilfley tables, one for each five stamp battery, are used. From 17 to 30 tons of ore per day are fed to each Wilfley without overloading them. The Wilfley tables are also used for unwatering the pulp and as auxiliary classifiers, the slime overflow being sent to pulp-thickeners.

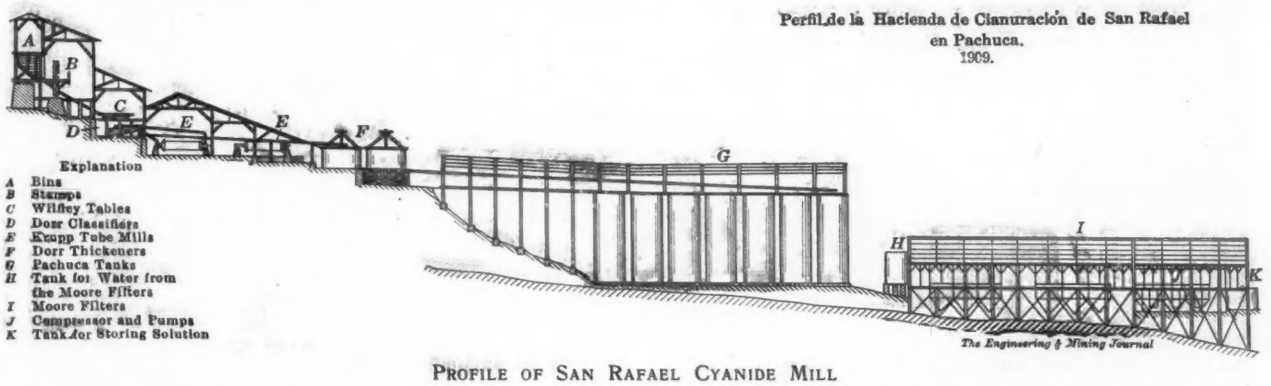
### Classification

Five Dorr classifiers, one for each tube mill, are used. From 50 to 70 tons of pulp, and all the return from the tube mill, are fed to each classifier; the pulp being in the proportion of 1:2.38 of solution; the discharge contains one of solution to two of dry sand. The Dorr classifiers have been working continuously for one year without giving any trouble. The slime discharge classified averaged for one month as follows: Over 100 mesh, 2.5 per cent.; over 150 mesh, 15.5 per cent.; over 200 mesh, 7.5 per cent.; under 200 mesh, 74.5 per cent.

### Tube Mills

Five Krupp No. 5 tube mills, 4x20 ft., with Neal's baffle at both ends and El Oro lining, are in use. Their capacity is rated at 50 tons of sand per day; the heads averaging: Over 100 mesh, 48.0 per cent.; over 150 mesh, 39.6 per cent.; over 200 mesh, 4.2 per cent.; under 200 mesh, 8.2 per cent. The discharged product averaged 74.5 per cent. under 200 mesh, as already noted.

Five Dorr pulp thickeners are employed to unwater the pulp previous to agitation, receiving slime diluted 1:10 and discharging one of dry slime to 1.2 of solution. Three of the thickeners, 20x10 ft., are supplied with 70 dry tons




PROFILE OF SAN RAFAEL CYANIDE MILL

NOTE—Abstract of an article in *Informes y Memorias* del Instituto Mexicano de Minas y Metalurgia.

*General manager, Compañía San Rafael y Anexas, Pachuca, Mexico.

of pulp each; the other two, 24x10 ft., take 100 tons and all clear overflow.

### Pachuca Tanks

Ten Pachuca tanks, 15x45 ft., are used for the agitation of the pulp at present; two more are being installed. The average charge is 100 tons of dry slime, and 120 tons of solution. One to one of solution (120 tons of slime to 120 of solution) has been tried, as well as 1:2 and 1:3, but the best proportion was found to be one of ore to 1.2 of solution.

### Compressor

One Rand-Ingersoll air compressor, 18¼ in. in diameter and 16 in. stroke, delivering at 100 r.p.m., 700 cu.ft. of air at 9000 ft. elevation, is employed for supplying air to the Pachuca tanks, to the Moore filter tanks, etc. The amount of air required for an energetic agitation is estimated at 100 cu.ft. per min. at 25-lb. pressure. The pulp is agitated during 36 hours, with a 0.3 per cent. KCN solution; left to rest from 12 to 24 hours, as it has been found that during this period the silver extraction increased about 20 grams.

### Filtration

Three units of the "A" No. 3 type of the Moore filter are employed. The leaves are 10x6 ft. and their capacity is 2.5 tons of dry slimes per day; 160 leaves are used in four baskets of 40 each; and 80 more are kept in reserve for repairs. Two traveling cranes, worm geared, with 30-h.p., variable-speed G. E. electric motors for lifting, and 5-h.p. motors for traveling, are used for transferring the baskets. According to the condition of the leaves, a one-inch cake is formed in from 20 to 30 min. One-hour barren solution wash, and a 15-min. water wash are given to the cakes. On each basket, one 16-in. spiral pipe, 20 ft. long, serves as a vacuum chamber and holds the cake during the five minutes of the transfer. In order to classify the solutions, sand filters are used before the zinc boxes. During October, the water discharge assayed 4.5 grams of silver to the ton; the cake, 55 grams unwashed, and 50 grams washed. During November, treating higher grade ores and employing three baskets only, one of them in bad state, the cake discharged assayed 71 grams of silver unwashed and 63 grams washed.

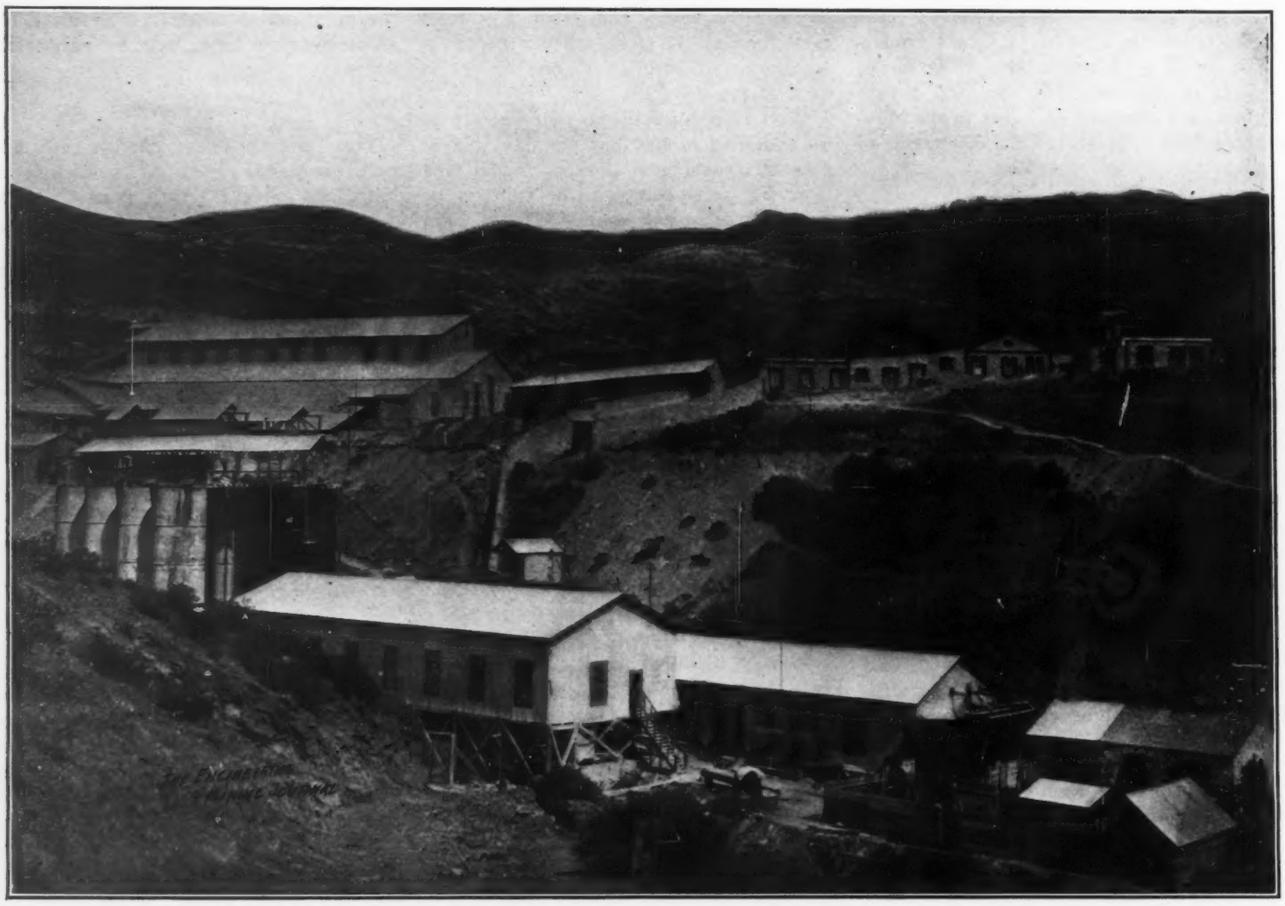
Zinc shavings, 0.006 in. thick, are used in precipitation. Two tons of solution to the ton of ore are precipitated. The heads in the boxes assay from 200 to 300 grams of silver; the tails, 2 grams. The clean-up is made weekly. The short zinc which remains on a 20-mesh screen is returned to the boxes; the short on 40-mesh is melted. The precipitates are pressed and dried to 20 per cent. moisture on a 24x24-in. Shriver press.

### Melting

Coke furnaces and Dixon's No. 300 graphite crucibles are employed for melting. The bars, without remelting, assay from 920 to 950 grams of silver and 5 grams of gold to the kilogram of silver. The slags are crushed quarterly in a battery and concentrated on a Wilfley table. The concentrates are melted and the tails are sold.

### A Monthly Résumé

A résumé of the November results on 8393 tons crushed shows as follows:



San Rafael Cyanide Mill, Pachuca, Mexico

*Ore Contents*—Silver, 0.901 kg.; gold, 4.430 grams.

*Concentrates*—Silver, 25,348 kg.; gold, 141,600 grams.

*Pachuca-Tank Heads*—Silver, 0.397 kg.

*Filter Discharge*—Unwashed, silver, 0.071 kg.; washed, silver, 0.063 kg.

*Extraction*—In concentration, silver, 24.19 per cent.; cyaniding in crushing, silver, 31.74 per cent.; by agitation, silver, 36.18 per cent.

*Total Extraction* (by assays)—Silver, 92.11 per cent.; gold, 97.08 per cent.; total extraction (as bullion) silver, 91.43 per cent.; gold, 97.08 per cent.

The report of the company for 1909 shows that the total milling cost for the first quarter was 4.87 pesos and for the last quarter 4.04 pesos, with a progressive decrease during the year as the mill operations were perfected.

The chief materials used per ton of ore milled were: Flints, 1.639 kg.; cyanide of sodium (128 per cent.) 1.067 kg.; acetate of lead, 0.283 kg.; lime, 8.261 kg.; zinc, 0.700 kilogram.

The cost per metric ton in December, 1909, was distributed as follows:

*General*—Management, etc., 0.375 peso; repairs and general service, 0.307; taxes, 0.031; sundry expenses, 0.032; total, 0.745 peso.

*Milling and Concentration*—Wages, 0.233 peso; power, 0.350; flints, 0.089; stamps, 0.050; tube lining, 0.222; sundry materials, 0.056; total, 1 peso.

*Cyanidation*—Wages, 0.074 peso; power, 0.014; cyanide, 0.904; acetate of lead, 0.132; lime, 0.123; sundry materials, 0.053; total, 1.30 pesos.

*Pumps and Compressors*—Wages, 0.018 peso; power, 0.104; sundry items, 0.003; total, 0.125 peso.

*Filtration*—Wages, 0.096 peso; power, 0.015; patent royalty, 0.150; sundry items, 0.002; total, 0.263 peso.

*Repairs and Costs of Filter Leaves*—Wages, 0.031 peso; materials, 0.018; total, 0.049 peso.

*Precipitation and melting*—Wages, 0.080 peso; zinc, 0.096; carbonate of soda, 0.006; coke, 0.051; borax, 0.33; crucibles, 0.047; sundry items, 0.052; total, 0.365 peso.

Total costs per metric ton, 3.847 pesos.

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In a letter of date of April 16, 1910, Mr. Girault wrote:

"Regarding the mill, some alterations in the way of handling the Moore filter have been introduced with good results. After the one-hour barren solution, and the 10- to 20-min. water washes, a secondary water wash, lasting from 10 to 20 min. is given to the cakes in order to improve the recovery of the dissolved metals, as we found that this extra wash gives better results than lengthening the barren-solution wash. The extra wash contains from 9 to 12 grams of silver per ton, and is precipitated in special zinc boxes independently of the main solutions.

"During March, 1910, using the extra wash, the cake discharged assayed: Unwashed, an average of 41 grams; washed, 38 grams. The water discharged with the pulp, about 1:1, assayed 3.8 grams per ton. The drums used as vacuum chambers on the baskets had to be discarded and a 2½-in. traveling hose substituted. We found that the long air leach required to dry the cake in order to avoid the salting of the wash solutions, could not be given with the drums as they would not hold the cake long enough."

## Notes on the West Virginia Oilfields

SPECIAL CORRESPONDENCE

In the Eagle district, No. 2 well of the White Top Oil Company has declined from 70 to 15 bbl. per hour; the Philadelphia Company well on the Lucas farm has declined from 10 to 3 bbl.; while the well on the O. B. Ogden farm, which started last winter with a flow of 90 bbl. daily, now yields only five. Near Wolf Summit, Deegan & Co. have brought in a 100-bbl. well on the M. A. Dennison farm. In the Clay gas district, W. K. Truly & Co. have struck, on the O. C. Martin farm, a well which is producing oil.

In the Shinnston district, the new wells have proved light producers and the gross output is still declining. Hope of finding an extension has been abandoned and the best thing that can be hoped is the discovery of a new pool. Gas has been found to the north and east of the old pool, and the gas companies expect to do drilling there during the summer.

### LINCOLN COUNTY

Lincoln and Roane are the only counties showing increases in production and these are not due to the size of the wells, for the overage output is under 25 bbl. per day, but to their staying power, so that a large proportion of the new work represents an increase in net production. Very little "wildcatting" is done, as operators prefer to keep within defined territory. The present daily output of Lincoln is about 5600 bbl. Recent strikes in Duval district are a 25-bbl. well on the W. T. Bell farm, a 15-bbl. well on the A. P. Oxley farm, a 30-bbl. well on the land of Thomas Fowler and a 10-bbl. well on the Cordelia Holton tract.

### MARION COUNTY

Exploration of the 30-ft. territory is quite active. Taylor & Dye have a new 30-bbl. well on the A. M. Morris land and an 80-bbl. well on the farm of George Phillips. In the Mannington district, the Fisher Oil Company No. 3 well on the H. C. Snyder tract is yielding 125 bbl. per day.

### MONONGALIA COUNTY

The Manufacturers' Heat and Light Company has a 50-bbl. producer in its No. 10 well on the McCann-Kinney farm on the South fork of Dunkard creek. Near it, on the Noah Henderson farm, the Wheeling Natural Gas Company has a 5,000,000-ft. gasser.

### ROANE COUNTY

In Walton district there is much activity. The Ohio Fuel Oil Company in its No. 12 well, which first struck a 5,000,000-ft. flow of gas in the salt sand, is now spraying 10 bbl. of oil daily; in well No. 11 it has a new 5-bbl. pumper in the Big Injun sand on the David March farm, while in the same sand on the J. A. Gandee farm it has a 40-bbl. producer. In Smithfield district, the Hamilton company has a 25-bbl. producer in the Austin-Fleshman land, and the Carter Oil Company has one yielding 60 bbl. on the E. S. Fisher tract; while in Spencer district the last named company has a new 2,500,000-ft. gasser on the Radeker farm and in Harper district its No. 13 well is producing 112 bbl. daily. The county has about 60 oil and gas drills in operation, and the present oil output is about 3700 bbl. daily.

### RITCHIE COUNTY

The Keener sand ground in Grant district is furnishing some good producers, among which are the 135-bbl. well on the Rexroad farm, just completed by the Indian Creek Oil Company; the 90-bbl. well of the Frimier Oil Company, on the Hammer land; the 150-bbl. well of R. G. Gillespie on the J. R. Kemper tract, and the 400-bbl. well of the Fisher Oil Company on the farm of P. R. Thorp. The cost of drilling down to the shallow Keener sand is light, and as long as 100-bbl. wells continue to be found, the drilling rigs will be busy.

### WETZEL COUNTY

Surveys have been completed for the 120-mile gas-pipe line of the Hope Gas Company, from New Martinsville up the Ohio river to Moundsville, Benwood, Wheeling, Wellsburg and adjoining cities. The pipe used will probably be 20 in. diameter.

## Testimonials to Pierre Martin

At a dinner held in Paris recently the Comité des Forges of France presented a gold medal to Pierre Martin, one of the inventors of the open-hearth steel process, which is generally known in Europe as the Martin or Siemens-Martin process. Further, as M. Martin, who is now 85 years old, has but little means, the Comité des Forges has voted to make him a donation of 100,000 fr. and has appealed to other organizations of iron and steel manufacturers to aid in the movement. The German Iron and Steel Union, in response has subscribed about 32,000 marks, and the British Iron and Steel Institute expects to raise at least £1000. This will make a fund of about $33,000 as a testimonial to M. Martin's services to the industry.

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The Great Northern Railroad is putting a number of mogul locomotives in service on its Mesaba Range system in Minnesota, with the result that the ore traffic is being handled with greater facility. The moguls have no difficulty in hauling 120 or 125 cars direct to Lake Superior without the delays formerly necessary.

# Cananea Consolidated Copper Co. in 1909

## Important Orebodies Opened in the Kirk Mine. Cost of Mining $2.22 per Ton. Plans under Way to Reduce Stack Losses

BY L. D. RICKETTS*

The following report of operations of the Cananea Consolidated Copper Company covers the calendar and fiscal year 1909:

ORE TREATED AND METAL PRODUCED IN 1909.

| | Tons. |
|---|---|
| Wet tons domestic ore mined | 826,364 |
| Wet tons domestic ore treated | 835,929 |
| Wet tons foreign ore treated | 225,607 |
| Total | 1,061,536 |
| Wet tons domestic ore milled | 602,366 |
| Wet tons foreign ore milled | 205,995 |
| Total | 808,361 |
| Ratio of concentration, domestic ore | 2.93 tons into 1 |
| Ratio of concentration, foreign ore | 5.19 tons into 1 |
| | Pounds. |
| Bullion product of domestic ore | 37,339,236 |
| Bullion product of foreign ore | 7,598,129 |
| | 44,936,365 |
| Fine copper in domestic bullion | 37,015,445 |
| Fine copper in foreign bullion | 7,532,244 |
| Total fine copper | 44,547,689 |
| | Ounces. |
| Silver in domestic bullion | 627,689.81 |
| Silver in bullion from foreign ore | 305,859.34 |
| Total silver | 933,549.15 |
| Gold in domestic bullion | 3,814.794 |
| Gold in bullion from foreign ore | 2,062.674 |
| Total gold | 5,877.468 |

Recovery from domestic ore: Copper, 2.206 per cent.; silver, 0.750 oz ; gold, 0.0046 oz.

### Development Work

During the year 46,911 ft. of development work were driven, as follows: Shafts, 463 ft.; winzes and raises, 5785 ft.; tunnels, drifts and crosscuts, 40,663 ft. This is in addition to subdrifts, etc., which were made in ore and charged as an item in "stoping."

### Combination Tunnel

In this development work is included the new Combination tunnel, which starts in Capote basin above the Capote mine and drives for 2500 ft. through the Indiana-Sonora ground and into the Elisa mine. This tunnel has been driven over 3000 ft. to Dec. 31, 1909, and but 300 ft. remained to connect it with the Elisa workings at that date. It strikes these workings 260 ft. below the old adit, and not only drains the mine to this depth, but furnishes a new and much more convenient outlet. This tunnel will play an important part in the development of the Indiana-Sonora ground as it passes 800 ft. below, and just to one side of, the croppings over one of its most important orebodies.

*General manager, Cananea Consolidated Copper Company, Cananea, Son., Mexico.

NOTE—Abafract from the 1909 report of the Greene Consolidated Copper Company.

### Elisa Mine

At the Elisa mine developments have been chiefly confined to the Combination tunnel, but the ore found on the two lowest levels is in notable quantity and of better than the average grade of last year. The Combination tunnel will be driven ahead along the Elisa zone about 2500 ft. further, and then we shall probably drive it west 6000 to 8000 ft. to a junction with the Henrietta, partly for the purpose of furnishing an outlet for that mine and for bringing water to the concentrator, but primarily to prospect this large area of contact between the quartz porphyry and diorite porphyry that appears to form the locus of the new Henrietta orebody.

At Henrietta an entirely new orebody has been found and is being developed. It lies on the opposite side of the cañon from the old mine. It consists almost altogether of smelting ore. During the year shipments of about 50 tons per day of smelting ore have been made, and there are 20,000 tons of ore broken in the mine. During the present year the output will be increased.

No development has been done at Puertocitos, aside from opening up new quarries.

### Capote and Oversight Mines

Capote work has been largely confined to the old workings in the fire zone. Encouraging results have been reached in following streaks of smelting ore to the southeast of the old stope above the first level. We now propose to unwater the mine and develop between the 700 and 1050 levels, where we know there is commercial ore, and also to develop the Black stope chute which has a large amount of mineralized ground.

Developments in the Oversight, the largest mine, have been most satisfactory. Not only have we found much of the profitable old filling above Tunnel 4, but have opened up in this ground notable quantities of both second-grade and smelting ore in the vicinity of the old bonanza stopes, and the ground around these old workings promises to furnish an output of 7000 tons per month for some years to come. The developments on the first and second levels of the Oversight have, however, been more important and the main ore zone has proved much wider than expected and much more extensive toward the west. These important developments only came in the latter part of the year and there is much to find out about the ground. There can be no doubt, however, that these new finds are important and that they will ultimately give a large tonnage of good ore.

### Veta Grande Mine

At the Veta Grande the most important development has been above the first level where the orebody extended much further east than we thought. A large tonnage of low-grade but payable ore has been developed here. We now propose to develop to the west through the large area of country that shows notable mineralization on the surface.

### The Kirk Mine

Possibly the most important development, although the tonnage opened up is not yet large, has been in the Kirk mine. Ore from this mine appears to be more deeply seated and is the result of contact metamorphism in limestone. As a consequence, these ores contain an excess of lime and iron over silica and alumina, and are all smelting ores. The zone through which the orebodies occur is very wide. The most important development this year in this ground is about 1000 ft. north of the old main shaft and in the vicinity of and parallel to the great fault that extends from the west of the Elisa mine to and beyond this ground, and which is the locus of the Elisa ore zone. The No. 12 shaft passes through a bed of lean ore 75 ft. thick, which can be mined to a profitable grade. To the west, in Tunnel 3, we are opening up ore of a much better grade and in notable quantities. As there is over a mile and a half of ground that is practically undeveloped on this zone between Shaft 12 and the Elisa, the new strikes in the Kirk are not only of importance themselves, but suggest far greater possibilities.

### Indiana-Sonora Mine

The Indiana-Sonora property was only acquired toward the end of last year and little development was done by us up to Jan. 1. We have, however, cut an orebody of second-class ore, 30 ft. wide, near the Oversight line in this property, and there is a large territory between the Oversight line and Capote creek which is regarded as exceedingly promising and which it is proposed to develop during the coming year. In the Eureka mine there appears to be a persistent shoot of basic smelting ore that will average bet-

ter than 4½ per cent. copper and 4 oz. in silver. From preliminary examination, this mine alone should yield from 5000 to 6000 tons of smelting ore a month.

On the whole, I consider the results of the development work during the period in question as more than satisfactory and as many of the faces in new ground are still in ore, and for other reasons that I have given, I consider the outlook for the future promising.

### Cost of Mining

The cost of mining was $2.22 per ton as against $2.13 per ton for the previous year, and $3.28 per ton for the 15 months ended Oct. 31, 1907. Of this sum of $2.22, $0.095 per ton consists of improvements and equipments installed and charged off during the year. I consider this most satisfactory for the reason that the extra money spent in development has amounted to at least $0.20 per ton over the same cost in 1908, and for the reason that there has been a greater proportion of smelting ore mined in the newer mines where the cost is necessarily higher. This will be illustrated by glancing at the accompanying table.

COST OF ORE MINED.

| Mine. | Wet Tons. | Direct Costs, Including Development. | Improvements, Betterments and Equipments. | Proportion Miscellaneous Development. | Total. |
|---|---|---|---|---|---|
| Puertocitos | 50,037 | $2.806 | $0.079 | $0.051 | $2.936 |
| Henrietta | 18,253 | 4.261 | 0.606 | 0.065 | 4.932 |
| Elisa | 71,352 | 2.367 | 0.170 | 0.075 | 2.612 |
| Capote | 100,101 | 1.842 | 0.210 | 0.044 | 2.096 |
| Oversight | 327,946 | 1.754 | 0.029 | 0.054 | 1.837 |
| Veta Grande | 208,670 | 1.805 | 0.032 | 0.054 | 1.891 |
| Kirk | 50,005 | 3.755 | 0.288 | 0.060 | 4.103 |
| | 826,364 | $2.071 | $0.095 | $0.055 | $2.221 |

### Power House Equipment

During the year we installed a cross-compound, two-step, condensing, Ingersoll-Rand compressor at the smeltery powerhouse, and connected it with the mines by an 11-in. main. The compressor has a capacity of 6000 cu.ft. of free air per minute. It has worked economically and is giving great satisfaction.

We also installed a 1200-kw. (1500-k.v.a.) horizontal Curtiss turbogenerator, and have or are preparing to equip all the mines with electrical hoists and pumps. The pumps and hoists that we have so far installed have proved most satisfactory and it has become evident that an extension to this system is necessary. I have ordered two additional turbines, of the same size, and a condenser abundantly able to take care of this increased power. The cost of this installation will amount to about $90,000, but it will greatly increase the efficiency of power used at the mines and will introduce such economies that the expediency of the investment cannot be questioned. With this equipment we shall be able to develop an abundance of electrical power for every requirement to meet the demands of our enlarged operation and for some years to come have one generator in reserve.

### The Concentrators

The cost of concentrating during the year has remained abnormally high, largely due to an insufficent supply of water, a plentiful supply of which has since been provided, and also to that fact that we have made radical changes with a view to greater saving, the most of which has been charged to operating account. The introduction of direct-acting pumps in place of centrifugals, and the building of a proper condensing plant have introduced marked economies in fuel consumption.

The impounding of tailings is now being done most successfully, and while the water is still acid we are able to get clearer water and we have put in precipitating tanks which take out a notable quantity of the copper that is in solution in the water.

In addition to the 50 vanners in mill No. 3, referred to in my last report, we have installed an additional unit of the same size, which is working satisfactorily.

The losses in concentration have continued high during the year. David Cole has designed and installed a drag classifier which promises important results, and although it has been in use for a short period, it is evident that the increased saving is going to be marked. Mr. Cole expects to be able to make a recovery of 80 per cent. of the contents of the ore, which on the class of ore we have to concentrate, would be splendid work.

During the year an efficient sampling mill was constructed that automatically samples the ore going to the concentrators and gives accurate results as to grade and composition. The Cole classifiers have been introduced into both sections in mill No. 2, and during the first six months of the coming year the old mill will be overhauled, one section at a time, and this system of classification introduced.

During the latter part of 1909 only three sections of the four in the old mills were in operation. One section at a time is being overhauled, and it will take until the first of June to complete this work, which will increase the tonnage at the concentrators by fully 25 per cent. over the former capacity.

### Reduction Division

The operations of the reduction division have been exceedingly satisfactory both regarding metallurgical results and costs. There has been a reduction in the cost of beneficiating ores and concentrates, and this reduction will continue.

The cost per dry ton of new copper-bearing material treated for the past several periods has been as follows: 1907, $6.82; 1908, $3.86; and 1909, $3.09.

The reduction is largely due to increased efficiency of the reverberatory furnace and to decreased costs in power, and to the fact that the company has been able to replace barren material by marginal material in the converting department. On account of the desire of all of our employees to obtain the best results, the latter move had to be made gradually in order that prejudice might be overcome, as the fear was freely expressed that the innovation would be dangerous. The concentrator slimes gradually replaced barren clay, and carefully selected ores were mixed with barren quartz in the linings, until toward the end of the year nothing but ore and slimes were used.

Finally we have found that America ore, without the use of any clay, is sufficient as a lining, and at the present time this ore is being used exclusively for converter lining without any mixture of clay either in the bodies or the lids of the converters, and while the combined silica and alumina amounts to but little over 70 per cent., as compared with 89 per cent. in the barren quartz, greater efficiency is obtained, pound for pound, with the former than we did with the latter lining. This is largely due to the fact that the ore forms a more compact lining and withstands mechanical erosion. Necessarily, the slag has become much more basic, and we are now making a converter slag containing 62 per cent. ferrous oxide. As a consequence, the converter slag has become a valuable flux and has largely replaced the barren iron and lime which were formerly used.

### Stack Losses

The experiments of the Boston & Montana Company at Great Falls, in smoke disposition and the determination of unaccountable losses, was of great importance to American metallurgy. Following their lead, Phelps, Dodge & Co. made elaborate tests and have developed the fact that stack losses in the Southwest are serious. During the coming year we shall determine our stack losses with a view of correcting evils. Partial rectification is justified without further tests.

The best method to be used to save the minute percentage of dust in the enormous tonnage of stack gases is hard to decide upon. In my opinion, preventative measures should be first introduced. Partially in line with these ideas, I am authorized to install a second reverberatory furnace with the accessory battery of boilers and six additional calcining furnaces. This will enable us to remove much of the remaining fines from the blast furnaces and largely decrease the dust. At the same time, this class of material can be melted far more cheaply and we will greatly increase the blast-furnace capacity; directly by taking fines from them, and indirectly by increasing the capacity per square foot of hearth area. With this installation the smelting capacity will be nearly double the tonnage handled in 1909.

### Reduction in Power Costs

The introduction of fuel oil, as mentioned in my last report, has been of great advantage to this company, and the fuel bill per ton of ore has been almost cut in two in spite of the fact that we are using more power per ton of ore than we did previously.

During the year we may look for the complete obliteration of all steam plants except those at the power house and the concentrators, and with it will come a decrease in the cost of power.

A great deal of money has been spent on the power house, both in introducing fuel oil and in increasing the efficiency of the individual engines. The power costs during the past two years have dropped from over $16 to under $8 per horsepower month, and while power costs will never be abnormally low, we can safely look for a cost per indicated horsepower of less than $7 and possibly not over $6 per month.

COST PER TON OF ORE TREATED.

| | Per Ton. | Tons Treated. |
|---|---|---|
| Fiscal year, 1905-1906 | $10.21 | 947,977 |
| August 1, 1905, to October 31, 1907 | 7.625 | 1,305,291 |
| July 11, to December 31, 1908 | 5.976 | 295,554 |
| Fiscal year, 1909 | 5.459 | 835,929 |

In making the expenditures for increased power and decreased cost per horsepower, we have been fortunate in having the advice of John Langton, consulting engineer, and it is evident that this advice has been exceedingly valuable. It has resulted, I think, in getting an economical and satisfactory installation.

### Mining and Beneficiating

The copper costs for the past year compare with the costs for the six months of operation during 1908 as shown in the accompanying table. The total cost of mining and beneficiating a ton of ore, including every cost until the refined product is sold, is also shown.

It will be seen that a notable reduction in the cost of beneficiation per ton of ore was obtained in spite of the large increase in development work and the large amount of improvements and betterments charged off to depreciation. The actual yield per ton of ore beneficiated was 51.25 lb. for the six months in 1908, and for the year 1909 it was 44.12 lb. The decrease in the yield per ton of ore beneficiated is the chief element in the practically stationary cost of copper during the last two periods mentioned. This drop in yield per ton appears more serious than it really is, for the reason that we were straightening out the mines and getting them in proper shape without unjustly depleting reserves or losing ore. A notable cause in the decrease in yield was due to extracting lean material, which overlies more valuable ore and which had to be extracted or lost. The decrease in yield is also partially accounted for by the introduction of lean copper-bearing material carrying about 1 per cent. as converter lining which replaced material that was formerly barren and therefore was not counted as copper-bearing material. Now we are using 3 per cent. ore for lining. It is safe to say that during the coming year the yield per ton will gradually and materially increase, and it may be regarded that the decreased yield during the past year was temporary.

DETAILED COST PER POUND OF COPPER

| | Six Months, 1908. | Year 1909. |
|---|---|---|
| Gross costs f.o.b. Cananea, cents per lb. | $0.099275 | $0.101740 |
| Freight to New York, export tax, refining marketing interest, etc. | 0.016864 | 0.017353 |
| Total cost | $0.116139 | $0.119093 |
| Credit for value of precious metals | $0.010545 | $0.10840 |
| Miscellaneous revenues, Cananea | 0.007520 | $0.007969 |
| | $0.018065 | $0.018809 |
| Total cost of fine copper sold | $0.098074 | $0.100284 |
| Construction not charged to operation | 0.007058 | 0.016119 |
| Cost, including every expenditure | $0.105132 | $0.116403 |

### Increased Output

Referring now to the paragraphs under the heading of "Development Work," I think it safe for me to say that we can at such time as is deemed advisable, increase the production materially and still pursue the usual conservative policy.

When the smeltery and concentrator enlargements and the power expansion now under way are completed, we shall have a monthly capacity, on the present grade of ore, of 6,000,000 lb. of copper for the affiliated companies, and I think that the encouraging developments fully warrant the enlargement of the plant to this extent.

### Freight Reductions

The Cananea, Rio Yaqui & Pacific Railway Company has made most notable reductions in freight from Cananea. Early in the coming year, when every legal requirement of both the Mexican and American governments is fulfilled, we shall be on a fair competitive basis as to rates with our friends and rivals across the line. Not only will there be notable reductions in coke, oil, lumber, etc., but also on all other commodities which the general public uses as well as ourselves.

### Self Sustaining Departments

The self-sustaining departments have constantly improved in efficiency and organization. We are under particular obligations to George Young for the able way in which he has reorganized the mercantile department. He has constantly kept in view the necessity of supplying our workmen with essentials at a moderate cost, and I think it will be found on comparison that the cost of the necessaries of life at Cananea are possibly as low as they are in any other camp in the southwest, in spite of the fact that much of our material is imported from the United States and has to pay heavy duties.

The public service department, under John A. Campbell, and the lumber and fuel departments, under the direction of T. Evans, have been well administered.

### General

Our concession from the State government required the installation of certain additional power, and this is practically completed. Early in the coming year we shall request the State government to inspect this work and we hope that it will more than meet with their requirements.

Our relations with the officials of the State and with the municipal authorities have been most pleasant, and we are fortunate in the wise and just administration of the laws of the State and municipality.

There has been no change during the year in the staff of the Cananea Consolidated Copper Company. The *esprit de corps* and efficiency of the staff is, I feel, almost perfect, and the advance we have made is largely due to the most careful study in committee, and to the carrying out of the plans decided upon by men whom I feel are most able experts in their particular lines.

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The report of the directors of the Cananea Consolidated Copper Company states that the Sierra Madre & Pacific Railroad Company repaid the mortgage loan of $400,000 advanced by the Cananea company, as mentioned in the report for 1908.

In the last annual report it was stated that the Cananea company held 75 per cent. of the stock of the Sierra Madre Land and Lumber Company as security for the payment of the purchase price of 51 per cent. of the stock of the Lumber company sold to William C. Greene. Since that time the mortgage given by the Lumber company to secure its $3,000,000 of outsanding bonds has been foreclosed for nonpayment of interest, and all its property has been sold to an English syndicate to satisfy its bonded indebtedness. In view of the large amount of indebtedness, it was decided that it would not be wise to involve the Cananea company to the extent of at least $7,000,000 necessary to save the Lumber company and put it on an operating basis. Before the foreclosure took place, an attempt was made to interest others in the Lumber company as an independent project, with the hope of protecting the Cananea company's claim, but without success. The resulting loss in this transaction is more apparent than real. The company's investment in the Lumber company was but $650,000.

Sixty per cent. of the capital stock of the Indiana-Sonora Copper and Mining Company was acquired near the end of the year by the Cananea Consolidated Copper Company. The remaining 40 per cent. has been purchased by the Cananea Central Copper Company. The Indiana-Sonora company, through its Mexican corporation owns about 400 acres of mineral land in the Capote basin, the center of the productive territory.

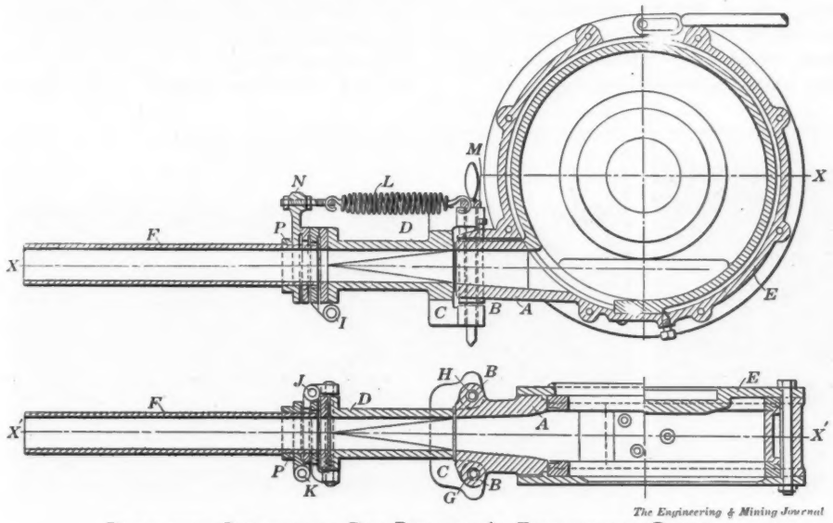
Approximately $150,000 were expended in the building of the proposed railroad from Cananea to Douglas, Ariz., for which the Cananea Consolidated Copper Company holds a concession. While this work was in progress liberal reductions in freight rates were made by the Cananea, Rio Yaqui & Pacific Railroad, in consequence of which the work of building the road to Douglas was suspended.

The auditor's report for the year gives the total earnings of the company as $5,510,846; total expenditures, $4,408,287; net earnings for the year, $1,102,559; depreciation of construction and improvements, $558,452. Net profits of $544,107 are reported for the year.

## Zinc Retort Charger

Emile Dor-Delattre, of Dorplein-Budel, Holland, was granted a patent in 1908 (Brit. Pat. No. 13,822) on an apparatus for charging zinc retorts and other analgous furnaces. His apparatus consisted of a propeller or feed wheel having radial blades, rotating in a casing carrying a charging tube and preferably arranged to turn about its axis. In the original apparatus, the tube was rigid and in one piece with the casing.

In a recent patent (Brit. Pat. No. 17,103, of 1909), Mr. Dor-Delattre has embodied improvements which facilitate and accelerate the charging operations. Prior to this patent, when the apparatus was moved in front of a furnace, there was a possibility of the charging tube fouling the retorts, furnace uprights or protecting screen. The improved apparatus with the tube hinged to the casing is illustrated in the accompanying figure. The retorts can be charged without stopping the propeller.




PLAN AND SECTION OF DOR-DELATTRE'S ZINC-RETORT CHARGER

Referring to the figure, the casing *E* is provided with a discharge branch *A* of square section, through which the charging materials thrown out by the blades of the wheel are delivered. *A* has two lugs *B*, to which are connected brackets of the sleeve *D*, carrying the charging tube *F*. A hinge *G* connects one of the lugs and one of the sleeve brackets, while the other lug and bracket has a pin *H*, that can be readily removed. The above arrangement allows the tube and sleeve to swing horizontally when the apparatus is not in use. By means of a hinge *I*, the outer end of the tube may be lowered, and the hinges *J* and *K* permit angular movements of *F* toward the right or left. Normally, the tube is kept as a prolongation of the sleeve, by a spring *L*, which yields in the event of the tube fouling. The spring acts on all three hinges *I*, *J* and *K* at the same time, tending to keep them closed.

## Greene-Cananea Copper Company

The annual report of the Greene-Cananea Copper Company for the year ended Dec. 31, 1909, states that it owns 944,987 shares of issued capital stock of the Greene Consolidated Copper Company, and 599,758 shares of the issued capital stock of the Cananea Central Copper Company. No dividend disbursements were made by either of these subsidiary companies during the last year. Operations, however, were carried on throughout the year by both companies.

### CANANEA CENTRAL COPPER COMPANY

The Cananea Central company owns the entire capital stock of the San Pedro Copper Company, the Mexican corporation which holds title to a number of claims at Cananea. During the year the Cananea Central acquired two-fifths interest in the Sierra de Cobre Mining Company, the Mexican corporation of the Indiana-Sonora Copper and Mining Company, title to which has been vested in the San Pedro Copper Company. The remaining three-fifths interest was purchased by the Cananea Consolidated Copper Company. The Cananea Central company's interest in the Cananea-Duluth Copper Company amounts to 268,270 shares out of an outstanding capitalization of 269,236 shares. The Cananea-Duluth Copper Company owns all of the stock of the Cananea Development Company, the Mexican corporation which holds title to the Dos Naciones mining claim at Cananea.

During the year the San Pedro Copper Company shipped 75,505 wet tons of ore, from which were recovered 3,271,614 lb. of fine copper or 43.33 lb. per ton of ore; 51,584 oz. of silver and 399 oz. of gold. The Cananea Development Company shipped 149,196 wet tons of ore, from which were recovered 4,169,850 lb. of fine copper, or 27.94 lb. per ton of ore; 251,435 oz. of silver and 1648 oz. of gold. The entire output of both companies was treated at the reduction works of the Cananea Consolidated Copper Company, the operations of which are reported elsewhere in this issue.

A small amount of barite mined in Mexico is used for paint purposes in Mexico City.

# Stoping at Homestake Mine of South Dakota

## Output 4000 Tons per Day. Orebody 500 ft. Wide in Places. Timberless Stopes 60 ft. Wide, Pillars 40 ft. Excessive Shoveling Increases Cost

BY JOHN TYSSOWSKI

Where there are 100 miles of underground workings, drifts, crosscuts, etc., in a mine, it is evident that all sorts of conditions will be encountered. The method of mining will necessarily show similar variations. This is true at the Homestake mine, of South Dakota. Luckily, however, fairly strong and well standing wall rock and ore are typical, so that the variations are more those due to the size of the orebodies and to the gradual evolution of system of working. The Homestake has been worked since the late 70's, and among its employees there is an organization known as the Homestake Veteran's Association, the qualification for membership being 21 years' service with the company. This association still exists after the recent trouble over unionism.

### Transition of Methods

Many of the early miners at the Homestake were from Virginia City, Nev., and as in a great many other camps, the early mining is a record of Comstock methods —a desire to square-set everything. Even today there are timbered stopes still unfilled, and which will stand open, no doubt, long after the square-set timbers rot and fall apart. Later, when the system of "open-stope" for filled-stope mining was adopted, still clinging to the old idea of putting in the timber, the entire sill floor was square set, supposedly for the purpose of keeping the haulage gangways from swinging. Fig. 1 shows a sill floor cut out and timbered on this old plan; the stope is ready to be worked. With this method no lagging was used over the timbers, except to protect the gangways, and it is said that the amount of timber that was crushed and broken in filling the sill floor was enormous. When the stope was drawn, this timber caused endless trouble.

### Gradual Reduction of Timbering

The uselessness of timbering anything other than the haulage ways on the sill floor was, of course, soon evident, so the next change in method was to break out the sill floor, then shovel through the necessary gangways, timbering and lagging them, and packing rock around them as a protection; the stope was then carried up. This method is still used in many places, but the last stage in the development of the stoping practice has been to do away with the use of even this timber wherever possible.

Open Cut Workings at the Homestake, Looking Either Direction from Ridge North of Lead, S. D.

### Orebody 500 Feet Wide in Places

In considering the operations at the Homestake, it must be borne in mind that the main ledge is so wide throughout most of its extent that the stopes must be carried across the orebody instead of along its strike. In other words, the hanging-and-foot walls are the ends of the stopes instead of their side walls. The width to which stopes are best worked parallel to the strike varies with the nature of the wall rocks, but it may be stated that as a general thing when the ledge attains a width of more than 80 ft., it has been considered best to lay out the stope across the orebody. In many places the orebody is over 400 ft. wide. The No. 1 North stope on the 700-ft. level was 60x520 ft. on the sill floor. This stope was worked with square sets. In working the level above the 900, stopes were carried 60 ft. wide from foot- to hanging-wall, and pillars of 60-ft. width were left between stopes. More recently, however, 60-ft. stopes and 42-ft. pillars have been adopted; the 1500 level from the Ellison shaft is being laid out on this plan. To a depth of 1100 ft., levels were carried at 100-ft. intervals; below that, they are 150 ft. apart.

### Present Stoping Scheme

The usual method of approaching these cross stopes through timbered crosscuts is shown in section in Fig. 2. The crosscuts along each stope are cut back into the pillar, so that a solid back protects them to some extent. The ore is drawn into these crosscuts, shoveled into cars and trammed out through the timbered drifts. Fig. 3 shows a similar section through a stope worked by the new timberless method, Fig. 4 being a plan of one of the stopes worked by this new scheme.

The orebody is first developed by a drift, as shown. Laterals, or crosscuts, are then turned off at 102-ft. centers and run through to the walls. Simultaneously, the stope sills being cut out by driving across between the pillar crosscuts and breaking out to the full 60-ft. width. The crosscuts pass through the center of the pillars, and at 30- to 35-ft. centers connections to serve as draw holes are broken through to the stope. These crosscuts are connected with the foot-wall drifts, serving as main haulage ways. The stopes are then worked up, just enough ore being drawn so as to keep the drillers within reach of the back. One or more manways, depending upon the conditions, is carried up with each stope. By maintaining the foot-wall drifts and tapping stopes through crosscuts in the pillars, timbering is practically eliminated in the first stage of the mining.

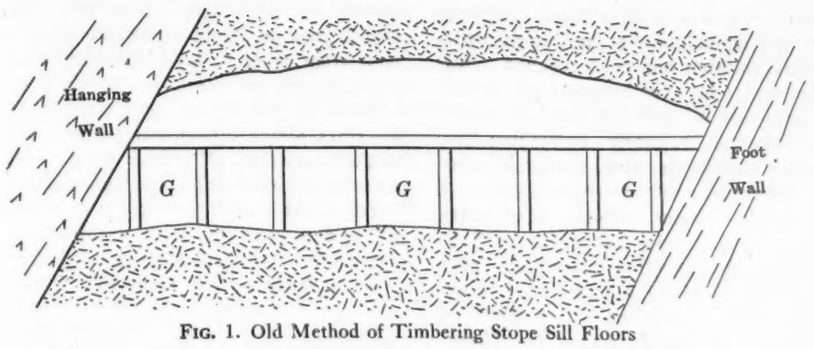



FIG. 1. Old Method of Timbering Stope Sill Floors

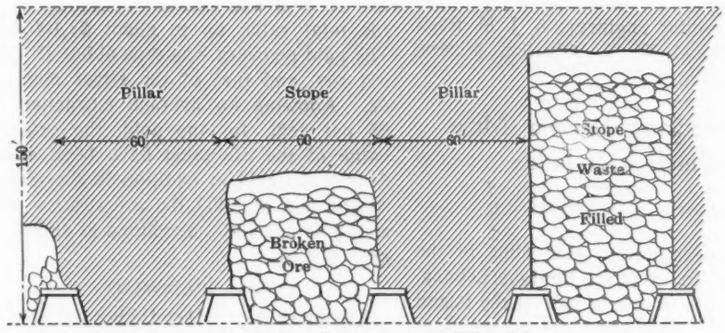



FIG. 2. Timbered Crosscuts on Side of Stopes

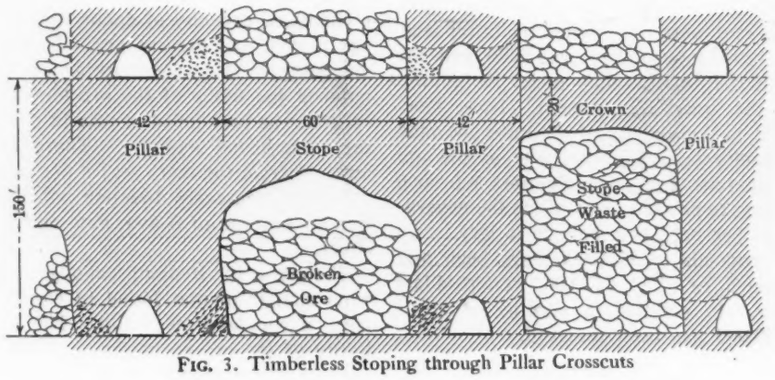



FIG. 3. Timberless Stoping through Pillar Crosscuts

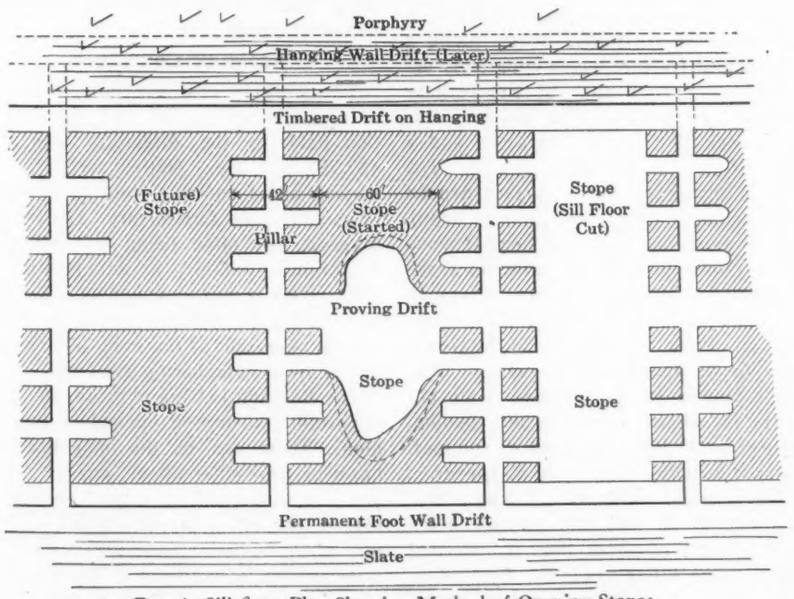



FIG. 4. Sill-floor Plan Showing Method of Opening Stopes

*The Engineering & Mining Journal*

The stopes are usually carried up to within 20 ft. or so of the level above; the back, or crown, being removed after the stope has been completely emptied of ore and filled with waste. The backs are taken up in small sections of 24 or 30 ft., using square-set timbers. On the 300 level, No. 1 Pierce stope, the back was being taken out at the time of my visit. This stope is about 100 ft. wide and 200 ft. long, and the back was probably 30 ft. thick. A hole was broken through on the foot-wall, where the ore is generally of better grade and the rock benched back toward the hanging. Finally about three sets of timber were put in next to the foot-wall, and under the remainder of the crown, which was then carefully worked out to the hanging-wall. In breaking out the crown, the ore is left across both ends of the stope so as to form a supporting arch, until the timbers are under the hanging-wall portion. This work is dangerous and requires careful watching.

It is planned to take out the pillars, even in the lower workings, by working them in small sections of square-set timbered stopes. This will be the second stage of mining at the Homestake. After the ore is drawn from the primary stopes the sides against the pillars are laced up with lagging set vertically, to which slabs laid horizontally are nailed. A section of lacing is put up, then waste run in from above until this section is filled; another section of lacing is placed, more waste run in, etc. Doubtless, by the time the pillars are removed the slabs will in many cases, be rotted, but they serve to catch up the waste as square sets are put in the pillar or secondary stopes. In all cases the crown over the original stopes must be taken out before the pillars are worked, or else this ore would probably be lost by caving, there being no support on the sides of the stope.

### BREAKING THE ORE

Up to date, only large piston drills have been used for breaking ore in the Homestake mine. (Trials are now being run with several makes of stoping, air-hammer drills.) By putting in long holes and picking favorable places, huge masses of rock ore slabbed down. It is this tendency of the ore to break large that accounts for the great amount of shoveling necessary. The ore will not run through chutes, and at each gate hole blockers with "Jap" plugger drills are kept busy drilling and breaking the ore so that it can be handled into the cars.

An idea of the amount of powder used in breaking rock is interesting as showing the conditions and efficiency of the mining. During one recent 10-day period, the average powder consumption was 0.94 lb. per car (a car holds approximately one ton of rock, 19½ cu.ft.). This average was made up from figures show-

ing a variation of from 0.54 lb on surface, glory-hole work, to 3.06 lb. on the 1400, and 3.02 lb. on the 1550-ft. levels, where most of the work was in development and cutting out sill floor of stopes. No. 2, or 40 per cent., dynamite is generally used. Powder costs the Homestake company nearly $600 per 24 hours.

Each day over 1000 cars of waste are brought into the mine through waste chutes extended from the open cuts shown in an accompanying photograph, to the various working levels of the mine. The north open cut is about 2000 ft. long; the south one nearer a quarter of a mile in length. There are seven main waste chutes. The opencut is at present supplying about 400 cars of ore per day. The last annual report of the Homestake company shows that the total operating cost per ton of ore milled and mined was $2.73, this on a 4125 daily tonnage. The cost of mining, exclusive of machine-shop and shaft work and of all general items of expense was $1.5862 per ton, made up as follows: Candles, $0.0265; fuel, 0.0017; lumber, 0.0262; labor, 1.1674; machinery, 0.1293; oil, 0.0022; powder, 0.1321; timber, 0.0778; sundries, 0.0229. These figures show that of the total cost of breaking ore, 73.5 per cent. is expended for labor, 8.3 for powder, and only 6.5 per cent. of the total for timbering of all kinds. Labor at the Homestake costs $3 per day for trammers and shovelers, and $3.50 for machine men. The labor union is not recognized.

### Mining Conditions at the Homestake

Conditions at the Homestake are ideal for the operation of shrinkage stopes, the ore being tough enough to present a back under which the men may work with safety and the walls being good and tight. Caving is the only other mining method that might seem applicable for working such an immense low-grade deposit at a profit. This, however, is not feasible as the ore is too tough and hard. In places near the surface immense portions of the orebody have been broken away, and after years of crushing and packing, are not yet sufficiently broken up so that the ore will run in chutes. In these places a small square-set stope is run up a few sets, a grizzly put in at the top and rock blasted down, being run for waste or ore, according to its character.

### Discussion of System

The objection to the methods employed in this great mine is, of course, that of the excessive amount of shoveling necessitated. Every bit of ore milled is mucked into cars by hand, and this alone means a cost of close to 20c. per ton of rock handled. As stated above, the cost of labor amounts to almost three-fourths of the total mine-operating cost. Many efforts have been made to overcome this excessive labor consumption for shoveling, but as yet no satisfactory solution has been reached. However, just now over one-half of the ore is recovered without the use of timbering, whereas formerly everything was worked with square sets. Doubtless when the margin of profit on the ore begins to get smaller, some scheme for cutting down this excessive labor cost will be forthcoming. Shoveling has already been eliminated in many places under somewhat similar conditions. T. J. Grier is in charge of operations at the Homestake; Richard Blackston is assistant superintendent and chief engineer; Bruce C. Yates, mining engineer; A. J. M. Ross, surveyor; and W. S. O'Brien, general mine foreman.

## The Redjang Lebong Mine, Dutch East Indies

Special Correspondence

The most important gold mine in the Dutch East Indies is the Redjang Lebong, situated in the southern half of the island of Sumatra. This mine has communication by a road 105 miles long with Benkoelen, a port on the west coast. At the time when the old native workings upon this reef were first visited by Europeans, in 1896, the country was wild and the natives only nominally under the control of the Dutch government. Now, however, in the vicinity of the mine the land is under cultivation and the people are prosperous and not only able but also willing to pay the taxes which the government has been bold enough to levy.

Dividends of £750,000 have been distributed, of which £170,000 were paid last year. In addition, a surplus of about £100,000 has been reserved.

### Geology of Orebody

The reef at the Redjang Lebong is a deposition of auriferous quartz along a pronounced fracture which apparently occurs in a narrow zone of Pre-Tertiary andesite, bounded on the foot-wall side by a rock of rhyolitic character, and a zone of clay on the hanging-wall. The clay is apparently but a surface deposit such as might grade, with greater depth, into a more compact and homogeneous country rock, possibly the andesite above mentioned. Although the reef shows in its better portion a decided banded structure, its limits, especially the foot-wall, have to be determined by assay. Pay ore is found in the andesite wall but where the quartz occurs in the rhyolite, even near the richer portions of the reef, the gold contents completely disappear.

The average width of the reef mined is about 40 ft. and this average holds over a length of about 1000 ft. Beyond this the vein filling gradually diminishes, although the fracture zone may be traced for a considerable distance in a northwesterly and southeasterly direction. The orebody has maintained the dimensions given from level to level but the value of the ore has become less with depth as is shown by the following figures: Surface level, about 15 dwt. gold; first level, 20 dwt.; second, 21 dwt.; third, 15.5 dwt.; fourth, 14.3 dwt. The figure given for the fourth level refers to the development to date upon that level, but the other figures are for the complete development of the orebody on the respective levels.

### Production

Up to the end of 1909, 466,620 tons of ore had been crushed, yielding 419,235 oz. of gold and enough silver to bring the total value up to about £2,100,000. The gold recovery was thus about 18 dwt. per ton, and that of the silver about 6 oz. Allowing an average extraction of 85 per cent. for the gold, the original value of the ore must have been about 21 dwt. in gold in addition to the silver. At the end of 1909 the ore reserve was stated as 307,138 tons valued at 18.2 dwt. gold per ton.

### Mill Equipment

The present mill installation consists of 70 stamps, and six tube mills, with a leaching plant for the sands and a filter-press plant for the slimes. These have a combined capacity of about 10,000 tons per month. At present about 8500 tons are being treated. As working costs are reduced the limits of the ore mined will no doubt be broadened to take in more of the mineralized andesite. There is an offshoot from the main reef into the andesite in a southerly direction which carries an average of 3 dwt. gold and some silver.

The ore at the Redjang Lebong is somewhat similar to that found in New Zealand, particularly at Waihi. The peculiarity of the ore is, however, in the occurence of selenium, this metal generally being found in the cyanide bullion to the extent of about 2 or 3 per cent.

### Economic Conditions

The working cost for 1909, exclusive of amounts written off and the proportion paid to the directors, was 32s. ($7.78) per ton. Native labor is recruited under contract from Java and is in general quite satisfactory. The climate is good, the mine being situated in a mountainous country at an elevation of about 1500 ft. above sea level. Rainfall is sufficient so that the necessary power for the operation of the mine plant is obtained from neighboring streams.

The Redjang Lebong is by far the most important ore deposit opened in this region. There are in the neighborhood, however, two other mines, one of which has just announced its second annual dividend, the other having started its battery of 40 stamps. These mines have the same natural advantages as has the Redjang Lebong so that their future development will be watched with interest.

# Copper River & Northwestern Railroad, Alaska

## Line 200 Miles Long. Three Miles of Road on Baird Glacier. Total Cost $13,000,000. Road Will Open Coal and Copper Districts

BY L. W. STORM*

The railroad now under construction up the Copper river in Alaska meets with a combination of difficulties unique in the history of railroading. Its immediate destination is the Kennicott-Bonanza mine, but it will serve also the whole Chitina copper region, in which the Bonanza mine is located, and, to a more limited extent, the remote interior lying north and east, toward the Yukon country.

### Character of Country Traversed

The Chitina valley runs parallel to the shore of the Pacific ocean, about 90 miles inland, and separated from it by a high, rugged and glacier-covered mountain chain, known as the Chugach range. At a point about 100 miles west of the Canadian boundary and the same distance north of the Pacific shore, the Chitina joins the Copper river, which then flows south, directly through the mountains for about 70 miles. This part of the valley is narrow and steep sided, with Wood cañon just below the mouth of the Chitina, and Abercrombie cañon 70 miles below. Abercrombie rapids occupy the lower two miles of the cañon and are impassable to any kind of boat. Stern-wheel steamers used by the railroad company to transport material above the rapids have been a great aid to construction.

Below the rapids, the river enters a lake, three miles long by one mile wide, lying north and south, with its whole eastern margin fronting on the terminal wall of Miles glacier. Icebergs of considerable size break from the glacier and float gradually to the west side of the lake and thence down the river. Below the lake the river flows west for a mile and then, turning south again, it flows for a mile or more along the face of Childs' glacier, which comes in from the west.

### The Delta of Copper River

The river finally emerges from the foothills about two miles below Childs' glacier and spreads out into its delta, which is 30 miles long and about the same width at the seashore. The water runs in a number of channels among sand and gravel bars, and sand islands piled up by the wind to a hight of 60 ft. or more above high-water mark. The islands become lower and flatter toward the ocean; there is a wide area of mud flats covered at high tide, and, beyond this, shoal water extends for several miles out to sea.

This delta is a waste country, subject to devastating floods in the summer, while in winter a blast of wind 60 to 80 miles per hour, and below zero in temperature, scours down the cañon and across the flats.

To the east of the cañon, a system of glaciers extends for 100 miles or more to Mount St. Elias, blocking all entrance to the interior. The strip along the shore is about 30 miles wide, and in this strip, backing up into the mountains and 25 to 60 miles east of the Copper river, lies the Bering river or Controller bay coalfield, lately so prominently before the public on account of the Cunningham coal cases.

West of the delta, between the mountains and the ocean, are low, swampy flats, extending about 20 miles to Eyak lake, which is 5 miles east and west, with mountains both north and south of it. Half a mile west of the lake is the shore of Cordova bay, an easterly arm of that sheltered body of water known as Prince William sound.

### Selection of the Copper River Route

The sea terminus of the railroad is at Cordova, on the shore of Cordova bay. Thence it runs east along the south shore of Eyak lake and over the flats to the Copper river. It crosses to the east bank to avoid Childs' glacier and recrosses to avoid Miles glacier. Then, after following along the rapids and passing through Abercrombie cañon it reaches Baird's glacier, which comes from the west, barely down to the river. The railroad follows along the edge of this on the ice, and leaving it, proceeds up the river valley. After emerging from Wood cañon, it will cross the Copper river once more just above the mouth of the Chitina, and then strike east along the base of the mountains north of the Chitina valley, and will terminate near the Bonanza mine, with a total length of practically 200 miles.

This route was chosen only after considerable hesitation and several starts from other terminals. Prospectors and

Copper River & Northwestern Railroad Yard at Cordova, Alaska

Piers for Main Bridge at the Upper Crossing of the Copper River

*Mining engineer, Valdez, Alaska.

others going into the interior copper country with dogs or otherwise soon gave up trying to go up the Copper river.

All travel into the region was over the mountains, by way of Valdez, at the end of the most northerly arm of Prince William sound. When the discovery of the Bonanza mine, in 1900, brought up the question of building a railroad into the copper country, the Valdez route again had the preference. It was thought that the two crossings of the Copper river could not be maintained in safety owing to the yearly menace of the ice breakup in the spring; the sudden floods in summer; the high winds in winter; and it was held to be extremely hazardous to attempt to maintain a railroad across a glacier, which was constantly melting and moving slowly into the river.

A number of railroads were started from Valdez, among others one by the Copper River & Northwestern Company in 1905 but as time passed, the terrors of the Copper river came to be considered less formidable, and in 1906 the ideal grades which it affords, together with the opportunity of building to the Controller bay coalfield and to the interior from the one terminus, decided the Northwestern company to adopt the Copper river route. The terminus selected was Katalla, about 20 miles east of the delta, on account of its nearness to the coal and to avoid the lower crossing of the river. Construction from this point was pushed during 1907, but in the fall of that year it was decided that the the breakwater to be built, in order to make a suitable harbor, would be too costly and the results too uncertain. Accordingly, the terminus was moved to Cordova, the nearest available natural harbor, where the rights of a rival company operating in 1906 had already been secured. Since then the work has progressed steadily without further change.

### Cordova as a Seaport

The town of Cordova lies on a broken hillside, about a mile from the main railroad wharf, and is connected with it by a wagon road, half of which is on a pile trestle over mud flats. Most of the bay is shallow, and there are broad areas of flats bare at low tide, but the wharf fronts on a channel of deep water which affords a good harbor at all times. This wharf is about 700 ft. long by 80 ft. wide, and is of the ordinary type, resting on a foundation of creosoted piles. After leaving this wharf and passing along the foot of the mountains, mostly on high trestle work over mud flats, the railroad passes on to the level ground between Eyak lake and the bay. Here the offices of the company are located, occupying the site and some of the buildings of an old salmon cannery at the head of an inlet. Shallow-draft boats can beach here at high tide. The rest of the area, about 200 acres, is the site of the old town of Cordova, but is now occupied by the railroad shops and yards.

### Construction across Marshes

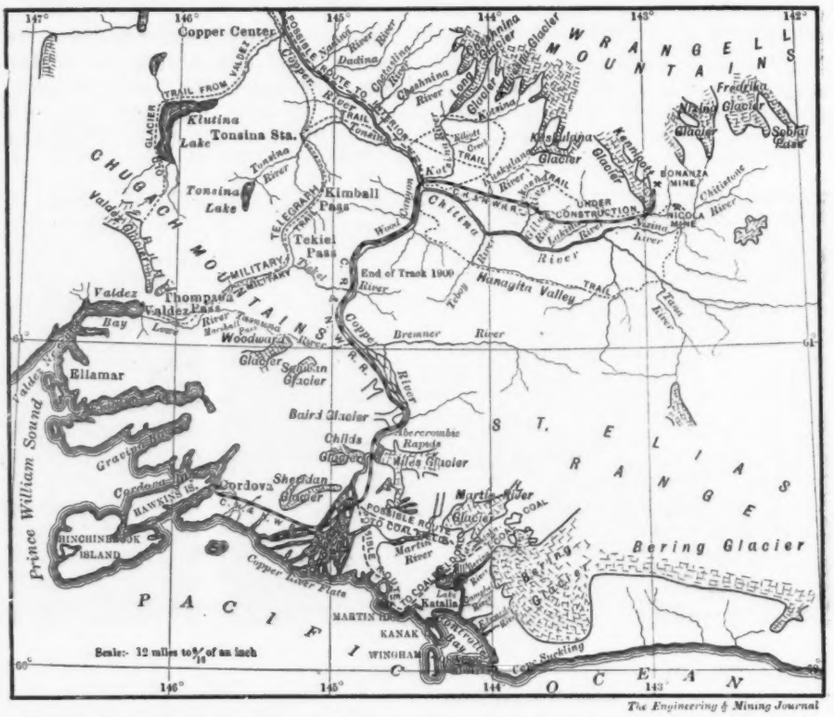
Construction along the lake and across the flats to the river was not difficult, but was slow, owing to the marshes being intersected by numerous turbulent streams heading in the glaciers five to 10 miles back in the mountains. Work could be done simply at the end of track, on account of the difficulty of transporting material ahead of construction. The track was laid on brush and temporary corduroy, in order to get along as quickly as possible and was afterward brought up to grade, 6 or 8 ft. above the general level, by hauling in gravel and filling under the ties.

As originally planned, the lower crossing of the Copper river was to be at the head of the delta, but this necessitated some heavy rock work in following the river, and the foundation to be had for the great bridge that would have been necessary was not satisfactory. The crossing was therefore placed lower down, using the large sand islands for stepping stones. The crossing is 12 miles in length, beginning at Mile 27 and striking diagonally across and up the delta to Mile 39, and is accomplished by means of steel bridges and pile trestles. There are two steel spans of 300 ft., one of 260 ft., four of 175 ft. and two of 150 ft.; and 24 wooden trestle bridges aggregating 11,850 feet.

### Construction of Copper River Bridge

From Mile 39, the road proceeds up the river to the upper crossing at Mile 49, where a four-span steel bridge, the most notable engineering feature of the road, is under construction. Its total length is 1550 ft., made up of two spans of 400 ft., one of 450 ft. and one of 300 ft. The top of the rails is 40 ft. above high water. The piers and abutments are of concrete and rest on a firm stratum of gravel, cemented by clay into a mass that can hardly be worked with a pick. This is 50 to 60 ft. below the river bed and was reached by sinking caissons through thinner layers of the same material, interbedded with layers of sand. The greatest pressure reached in the caissons was about 30 lb. per square inch.

The caissons were sunk during the low water of the late summer, but the raising of the steel was accomplished mostly from the ice during the past winter, most of the time in a howling blizzard. The total cost of this bridge will approximate $1,500,000. It is expected to be ready for trains by fall, and in the meantime they will be ferried, a car or so at a time, across the river.




COPPER RIVER REGION, ALASKA, SHOWING ROUTE OF THE COPPER RIVER & NORTHWESTERN RAILROAD

### Bridge Designed to Resist Ice Jams and Wind

The chief dangers to the bridge are from icebergs, ice jams and the high wind. The wind does not strike broadside, but with the long, high spans of this narrow single-track bridge it is a serious feature and results in a design, in which the members bearing the wind stress look like the main members of an ordinary bridge. It is well understood that this bridge may have to resist wind of 100 miles per hour velocity.

To guard against ice, a great block of concrete has been set up stream from the one pier which stands in the main channel. This has an inclined edge pointing up stream, which will allow an iceberg to slide along it, rising somewhat, until it is broken and the pieces deflected to either side of the pier. The bridge itself is high enough to be out of the way of the ice. There being only one-eighth of the ice above water, any iceberg standing more than 15 or 20 ft. in the air, goes aground somewhere in the lake and breaks up before it reaches the bridge.

From the bridge the road runs about five miles past the rapids, and at the head of these reaches a grade about 20 ft. above the highest known high water in the river, an interval which it keeps all the rest of the way through the cañon.

### Crossing the Baird Glacier

In the neighborhood of Mile 60 is the three-mile crossing of Baird glacier. This offered none of the difficulties that were predicted, and there has been little trouble in maintaining the road over it. The glacier is stagnant and is overlaid with from five to 20 ft. of earth and broken rock, which has been undisturbed for so long that it is heavily overgrown with alders and other bushes. There appears to be less ice under the track than was supposed, and when its melting allows the track to settle a few inches, the loose rock and gravel are at hand to fill under and bring it up to grade.

There are no difficulties beyond this small glacier, such as are not continually met in building railroad through mountainous country. The snowfall is heavy and there is considerable danger of slides in Abercrombie cañon and elsewhere, necessitating the construction of snow sheds. The rock work is heavy in places for the last 30 miles along the river, especially through Wood cañon. The present end of track is at the mouth of Tiekel river in Mile 102.

At Mile 132, the road will cross the Copper river for the third time and proceed on up the Chitina. Up to this point the construction is to be that suitable for a main trunk line. Seventy-pound rails are used; ties are of Puget sound fir, 7x8 in. by 8 ft., for the first 90 miles. The grades are excellent, being all in one direction, varying but little and not averaging over 0.5 per cent. From Cordova to Mile 107, the grade rarely exceeds 0.4 per cent. From Mile 107 to 122 it is close to, but does not exceed 0.5 per cent. The maximum is 0.75 per cent. for a stretch of three miles in and approaching Wood cañon, at about Mile 125.

### Chitina River Branch

The road up the Chitina to the Bonanza mine is in the nature of a branch. It follows along the foothills three to 10 miles north of the river to avoid the deep narrow cañons of tributaries crossing the wide plain of glacial débris. Close to the hills, these cañons are not so deep, but they are numerous and the ground is somewhat rolling. The standard gage is preserved, but the grades are heavier, reaching as much as 2.5 per cent. for occasional stretches. Native hemlock ties will be used. The last six miles from the foot of Kennicott glacier to the lower terminal of the aërial tram, which brings ore down from the mine, will be the steepest part of the road, some of it 3.5 per cent.

### Source of Traffic

The total length is 195.3 miles. The total cost, including what has been spent at Valdez and Katalla, will exceed $13,000,000. The greatest present resource to furnish traffic for the road is the Bonanza mine, valued at between 10 and 20 million dollars.

The copper field in general, occupying the northern drainage of the Chitina and extending back from it from 10 to 50 miles, will produce an increasing amount of business as its mines are developed, and whenever the development of the resources of the upper Copper river or some region further north will justify it, the road can be extended to serve that country as well. Farming is among the possibilities of the region.

### Controller Bay Branch

The route to the Controller bay coalfield is not decided upon, or at least, not made public, but it will branch off from the main line at about Mile 39 and proceed to the coalfields, either by way of Katalla and up to Bering lake, over a pass less than 100 ft. high, or by a more direct route up Martin river and over a pass 400 to 500 ft. high. In either case the length of this branch, to the remotest accessible parts of the field, will not be over 60 miles, with no serious obstacles to be overcome. When once tne present uncertainty regarding the disposal of Alaska coal land is cleared up, this branch should be the most profitable part of the system.

### Difficulties of Maintenance

The difficulties of construction and maintenance, which were feared by many as insuperable, have been dealt with successfully. The worst trouble has been on the flats and the delta. In February, 1909, an overflow from the river covered the track for several miles, to a depth of three or four feet, in places where it had not been brought up to grade. This froze solid and blocked the road for three weeks. But now that the track is up to grade, no similar trouble is looked for. This overflow appears to have resulted from a subsidence of the end of Miles glacier, which had stretched out over the lake and is believed to have settled down suddenly. Nearly all such sudden rises in the river have their origin in some glacier at the head of a tributary. The bursting of a glacier lake which has been accumulating water for months, or possibly years, can produce a flood which even the cloudburst floods of the desert regions cannot equal for violence.

Again, in February of this year, a blizzard of unusual duration snowed in a train and snowplow at Mile 34 and blocked the road for nearly three weeks. Avalanches in Abercrombie cañon have blocked the road several times, but such occurrences can be guarded against by snowsheds wherever it is found that there is danger of them.

It will doubtless require several years to discover the best ways of dealing with unusual conditions along the line. There are even persons, more or less qualified to express an opinion, who still predict the ultimate failure of the road. However, the majority of such persons are interested in other routes. The construction progresses without serious interruption and the engineers who have the responsibility in the matter and who have investigated fully, express no uneasiness as to the outcome.

## Wet Assay for Vanadium Ores

A rapid method of determining vanadium in ores is given by P. y. Alvarez in *Chem. Zeit.* From 0.5 to 1 gram of the finely ground ore is fused with seven or eight times its weight of pure, dry sodium peroxide, keeping the mixture at a red heat for about 20 min. After extraction of the mass with boiling water, the alkaline filtrate is acidified with sulphuric acid, alcohol added, and without filtering a current of sulphurous acid is passed through until the solution is nearly saturated. This is necessary to effect complete reduction, especially if arsenic be present. If necessary the blue liquid is filtered, and the alcohol and sulphurous acid removed by heating and passing a current of carbon dioxide through the solution.

At this stage, if arsenic is present the solution is treated with sulphuretted hydrogen, the arsenic sulphide filtered off and the excess of sulphuretted hydrogen expelled by boiling. The vanadium solution, which should be of approximately 1 per cent. strength, is titrated with potassium permanganate. As a check, a solution of ammonium metavanadate from which the ammonia has been expelled by caustic soda, is treated under precisely similar conditions with regard to concentration, acidity and temperature. The oxidation of the hypovanadic acid to vanadic acid is considered complete when the change from the blue to pink color is permanent.

# Laborers in the Bituminous Coal Industry

## Only a Small Percentage of Our Foreign Miners Have Had Training Abroad to Fit Them for Mining. Average Yearly Earnings About $443

## SLAVIC RACE PREDOMINATES

Senator Dillingham, chairman of the United States Immigration Commission, has presented to the Senate the first instalment of a report on the bituminous coal-mining industry in the United States, prepared for the commission under the direction of W. J. Lauck, superintendent of agents. The work done by the commission on the bituminous-coal industry will be published in three parts, one dealing with general conditions in the industry as a whole, one with the conditions in the Pennsylvania field, and one with the Southern and Western fields. The instalment now ready for publication is an outline view of the situation in the industry the country over. It is of special interest because of the fact that this is the first of the commission's reports upon purely industrial phases of immigration. Former reports have treated the statistical or social aspects of the question, but the commission is now ready to begin the publication of the economic investigations which have constituted an important portion of its inquiries.

The method adopted in the coal report is typical of that followed throughout the industrial inquiries.

In preparing the report there has first been presented a brief summary statement of the facts and conditions developed by the investigation. Then a division is made following the distribution of the bituminous-mining industry in the United States. This is with the idea of showing the difference in working and other conditions in the different sections of the country in order to show the status of the various races under different environments, and to exhibit relative inducements to immigration offered by the different sections of the country. Finally, representative communities were selected for intensive study in order that a verification of the tendencies exhibited by the more extended tabulations might be had, that direct effects of recent immigration upon American life and institutions not covered by the statistical tables might be presented, and that more definite conclusions as to the economic effects of immigration might be reached.

The investigation in Arkansas, Texas, Kentucky and Tennessee was not, however, made in as great detail as in other States, because a preliminary survey revealed the fact that comparatively small numbers of recent immigrants were employed in these States. Although it had originally been planned to study the coke industry in conjunction with the bituminous mining and to embody the results in a separate report, it was later found necessary to include in the tabulations of bituminous-coal mining, the returns secured from employees of coke works, and to make no distinction, except in historical and descriptive matter, between mines engaged exclusively in the production of coal and mines having coke ovens in connection with their coal operations.

### Subject Is Treated Economically and Statistically

In the section of the report on the bituminous-coal industry made public by Senator Dillingham, the subject is first treated economically and statistically, then descriptively. After reviewing the general conditions in the industry and the growth of the production of coal, the report turns to the racial situation in the mines and considers the question of displacements of given racial groups of workers by others. It then analyzes in great detail the economic or wage status of the immigrant coal miners and describes the conditions under which the occupation of mining is carried on in actual practice. From this it passes to a detailed study of the housing and living conditions of the miners and to full description of literacy, age and conjugal condition of the various groups of miners studied. The extent to which the immigrant miners are being assimilated to the civilization of this country is dealt with in the concluding section of the monograph, and the opinions there reached are based upon analysis of educational conditions, naturalization and other factors which tend to determine whether the immigrant shall remain a foreigner in thought and action or become an American citizen. The significance of the work thus completed is evident when it is understood that the individuals who have been directly studied in the course of the investigation constitute about one-fourth of the total number employed in the industry, so that there can be no doubt of the representative character of the results reached.

Starting with the production of coal, the report on the bituminous industry shows that the output has increased from 6,494,200 short tons in 1860 to 332,573,944 short tons in 1908, while at the same time the coal-producing area has been greatly expanded. Today, it is shown, Pennsylvania produces 35.2 per cent. of the total output; West Virginia, 12.6 per cent.; Illinois, 14.3; Alabama, 3 per cent., etc. The production of Ohio, which was 19.5 per cent. of the total output of the United States in 1860, is now only 3.5 per cent., although the number of tons turned out in that State is larger now than it was then.

The exact number of employees studied in the industry as a whole was 88,368, of whom one-fifth were native whites born of native father, while 7.6 per cent. were native-born negroes. One-tenth, or 9.5 per cent., were native-born children of foreign fathers. Persons born abroad constituted 61.9 per cent. of the total. More than four-fifths of the children of the second generation—native born of foreign fathers—are children of immigrants originally from England, Ireland, Scotland, Wales, Germany, France, Belgium, Sweden and Canada, but only about one per cent. of these second-generation immigrants were children of fathers originally from Austria-Hungary, Russia, Italy and other countries of southern and eastern Europe.

### The Slovak Is Most Extensively Employed

Analysis of the figures obtained for the miners of foreign birth shows that, of all races of recent immigrants, the Slovak is most extensively employed in bituminous mining, about one-eighth of the total number who furnished information being members of that race. The Poles and Italians come next in number, the former being one-twelfth and the North Italians and South Italians combined, one-eighth of the total number. The Magyars, Croatians, Russians and Slovenians rank next, as a group. Summarizing the results obtained, it is seen that about one-fourth or one-fifth of the total number of employees in the industry are American whites, about one-fifteenth are negroes, about one-tenth are immigrants of the second generation, principally descendants of English, Irish, Scotch, Welsh and German immigrants of past periods, and from one-half to three-fifths of the total number of miners are members of races of recent immigration.

The investigation dealt not only with individuals, but with households, and an important part of the work was an intensive study of living conditions in the 2371 households from which information covering 14,229 persons was secured. This investigation showed that in the households studied, 94.6 per cent. of the persons were foreign-born. In this household group it appears that the Slovaks, Poles, North Italians and Mag-

yars, each reporting over 10 per cent., constitute 57.7 per cent. of the total number of persons from whom information was obtained, these proportions ranging from 19.7 per cent. for the Slovaks to 10.6 per cent. for the Magyars. The South Italians show the next largest proportion, or 9.1 per cent., followed by the Lithuanians and Croatians with 7.2 and 6.6 per cent., respectively, while the proportions of the other races range from 2.1 per cent. each of the Germans, Irish and Ruthenians, to 0.4 per cent. of the French and Roumanians.

A comparison of the proportions of these persons for whom detailed information was secured according to sex discloses the fact that the proportion of foreign-born over native-born males is slightly larger than the proportion of foreign-born over native-born females. Among males, 94.4 per cent. of whom are foreign-born, the Slovaks with 18.8 per cent., show the largest proportion, followed by the Poles, North and South Italians and Magyars, each reporting proportions in excess of 10 per cent. With the exception of the Lithuanians and Croatians, who show 7 and 4.8 per cent., respectively, none of the remaining foreign-born races reports a proportion of the total number of males in excess of 2.4 per cent. Of the total number of females for whom detailed information was secured, 92.7 per cent. are foreign born, as compared with 7.3 per cent. who are native born.

### In Pennsylvania Foreigners Predominate

The bituminous investigation shows that in Pennsylvania the preponderating number of mine employees have been of foreign origin ever since 1870. At first the operating force of the mines was made up of native whites and representatives of the English, Scotch, Irish, Welsh and German races, the miners from Great Britain and Germany being usually trained men who had had experience in the industry before they left home. Immigrants from southern and eastern Europe began to arrive about 1880, the Slovaks coming first, and then the Magyars. After 1890, Poles began to be employed, then in 1895, Italians, and in 1900 Croatians.

During the past 10 years practically all new labor for the mines has been obtained from southern and eastern Europe. The report shows that during recent years the races of the older immigration have been increasingly displaced by the newer immigrants. At present, practically no natives or English, Irish, Scotch, Welsh or Germans of the first or second generation are entering the Pennsylvania bituminous mines. In the Middle West, the demand for labor has been supplied by immigrants from Europe and Great Britain. The mines of this section, however, drew upon the Pennsylvania fields for their labor to a marked extent, although during the decade 1890 to 1900 there was a change in the racial composition of the miners, the older immigrants being driven to the Southwest, especially to Kansas and Oklahoma.

### Thirty-two Races Employed

Prior to 1895, the number of immigrants from southern and eastern Europe who went to Oklahoma and Kansas was very small, but they are now being employed there in large numbers. Thirty-two races of foreign birth are now employed in the mines of the Southwest. In the Alabama field, immigration began 20 years ago with the coming of the Scotch, English and Welsh miners. Soon afterward, Slovaks, Poles, French, Irish and a few Italians arrived. Latterly, the immigration has included Italians, Bulgarians, French, Scotch and many Russians, Croatians and allied races. Twenty-nine races are at present employed in the Birmingham region.

Similar conditions exist in the Virginia and West Virginia fields. Tabulations of 54,300 employees, representing 44 specified races among the miners, shows that 2569, or 37.9 per cent., have been in the United States under 5 years; 16,088, or 29.6 per cent. have been here from 5 to 9 years; 4582, or 8.4 per cent. have been here from 10 to 14 years; 4875, or 9 per cent. from 15 to 19 years; and 8186, or 15.1 per cent., have been here 20 years or longer. This means that 67.5 per cent., or over half, of all individuals reporting information have been in the United States under 10 years.

Analysis of the figures by races proves conclusively that the races from northern and western Europe are by far the larger part of the men of long periods of residence, while the large majority of persons in the short-residence periods belong to the southern and eastern European races. The new labor forces are being recruited almost entirely from the south and east of Europe. This view is corroborated by noting that within the same racial group but a small percentage of those represented are found in the short-residence periods, the majority being persons of long periods of stay in the United States.

### Average Yearly Earnings Only $443

One of the most notable features in the report is seen in the showing made with reference to occupations of immigrants before their arrival in the United States. It appears that the great majority of the immigrants from southern and eastern Europe, in contradistinction to the immigrants of the older immigration, who were in many instances trained men, had been farm laborers or independent farmers before coming to this country. Probably more than two-thirds were farmers or farm laborers, while one-sixteenth were common laborers abroad, and about one-fifteenth were engaged in hand trades of some description. Only a very small percentage had had training abroad which would fit them for mining. It is not strange, therefore, to find that for 3766 male employees furnishing information, the average yearly earnings were only $443. Of this number, 44.8 per cent. earned less than $400, 85.4 per cent. less than $600, and less than 1 per cent. earned $1000 per year. Of the total number, 91.7 per cent. were foreign-born and had earnings averaging $438, and 8.3 per cent. were native-born with average yearly earnings of $497. Among the persons who were native-born of foreign father, the Irish showed the highest average annual earnings—$532—followed by the English with $527, the Germans, with $475, and the Welsh, with $466.

The hours worked vary somewhat with different localities, depending in part upon whether the labor in the different places is organized or not. In Pennsylvania, nonunion localities, hours are about 10 per day and 60 per week, while in the Middle West, where the unions are strong, the custom is 8 hours per day and 48 per week. Methods of paying wages also vary considerably, and in some sections the use of the company store and the various deductions made from wages, as well as the fact that houses occupied by mine employees are ordinarily owned by the companies, leaves but little to be paid in cash.

The houses afforded by the companies vary a good deal in quality, being quite satisfactory in some localities and in others unsanitary, crowded and poor. In nearly all cases the rent charged is large enough to furnish a very substantial profit on the investment made in the original building. Some companies furnish certain perquisites or privileges to the employees, such as the use of coal, hospital advantages, and the like, while others furnish practically nothing whatever and undertake no welfare work.

### Labor Unions

The extent to which the employees are affiliated with labor unions is largely a matter of local conditions of employment. The mines of the Middle West and Southwest are operated under an agreement between the trade unions and operators, and employment in the mines is conditional upon membership in the unions. Only a few mines in the South are unionized, and in Pennsylvania the coke region is entirely without labor organizations. Considerable variations in standard of living and amount of house room used were found by the commission. The highest rent per apartment, room, and person was paid by the families native-born of native father, their average being $8.43 monthly per apartment, or house, $2.10 per room, and

$1.95 per person. The Welsh ranked second in average rent per house and person, while the Mexicans paid the lowest. Taking the room basis, the Roumanians ranked lowest with $1.31 per room. The Russians paid the lowest average rent per person, 85c., and ranked third from the highest, with $5.30 per apartment or per house. In general, it was found that the crowding and lack of independent family life was at a maximum among the races from southern and eastern Europe, among whom there was a large number of unmarried men and where, consequently, an extensive system of boarding prevailed.

### More than One-sixth of Our Miners Cannot Read or Write

Statistics for literacy showed that of the 86,909 male employees covered by the investigation, 14.9 per cent. were unable to read or write. Of the foreign-born, 80.9 per cent. were reported as being able to read and write, while 92 per cent. of all native-born, 96.1 per cent. of native whites born of native father, and 97.9 per cent. of native-born of foreign father could read and write. Of native negroes, only 73 per cent. could read and write. Of the foreign-born, the English, Scotch, Irish, Dutch and Swedish report a higher percentage of literacy than do native whites born of native father. The southern European races which ranked highest in point of literacy were the Bohemians and Moravians.

The commission found that tendencies to home ownership were greatly obstructed in their working by the system of company houses and the practical inability of the immigrants to buy the houses they occupied; while the acquiring of English was slow owing to the clannishness of the foreign races and the race suspicion and prejudice exhibited toward the southern Europeans by the native-born workers and the older immigrants from northern Europe. Interest in political conditions and the desire to acquire citizenship was strong in a few races, but was not very general, only 51.1 per cent. of foreign-born males with a residence of 10 years or over being fully naturalized.

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The United States Government purchases annually from $6,500,000 to $7,000,000 worth of fuel. This sum includes the cost of delivery and of stowage. Each department buys coal through its purchasing agent. The Navy, War, Treasury, Interior and Commerce and Labor Departments are large consumers of coal. Much of the coal used by the Government must be delivered by wagon, and the business is, therefore, limited to dealers having hauling facilities. This is especially the case in the city of Washington, where coal is purchased principally for heating the public buildings.

## Rescue Work after Mine Explosion*

Perhaps no explosion of which a complete record exists has afforded clearer evidence of the dangers from afterdamp and of what might be called the time relations of this danger, than the recent explosion at the Darran colliery in South Wales. The three men near the shaft were only exposed for a short time to the danger, and apparently they were not even stupefied by the gas. The explosion was started by blasting on the intake road, about 400 yd. from the down-cast shaft. The man who fired the shot was still conscious some time after the explosion, and his three companions were still alive. One was found unconscious from carbon-monoxide by the rescue party and recovered consciousness after being brought out.

We also know that lamps burned in the track of the explosion a few minutes afterward, and some of the men from the inbye side were close at hand, and, although knocked down by the blast, relighted their lamps and went for some distance into the track of the explosion before turning back. There must, therefore, have been more than 80 per cent. of pure air in the atmosphere at this point. Rescuers carrying lights afterward traversed the whole track of the explosion, and finally succumbed to carbon-monoxide poisoning.

### Protecting Men From Afterdamp

It thus appears, continued Doctor Haldane, that there is a considerable time during which even men lying on the track of the explosion could be saved if only it were possible to protect them from the afterdamp. There are three possible ways of protecting the men from afterdamp. One is to get pure air to them; another is to get them out of the afterdamp; and a third is to give them oxygen to breathe until they are in pure air again.

Passing on to consider what might be done in the first of these ways, Doctor Haldane said that if, as was generally the case, the downcast and upcast shafts were close together, separation doors and air crossings would have been destroyed, so that fresh air could not be got round the pit in the ordinary way. The shafts, and a short distance from them, would, however, be swept by fresh air almost at once. Even if the fan had been injured, the warmer upcast would induce a powerful air current, and it would probably be possible to descend the upcast at once and rescue any men who were close to either shaft.

If the workings were connected with any other pit, it might be possible to clear out the afterdamp by sending men to open the communicating door, meanwhile covering up the top of the downcast shaft with planks. Air would thus be drawn through the communicating door and main road toward the upcast; and the afterdamp would be expelled by the shortest route. It seemed as if this plan would have succeeded after the Darran explosion, as the track of the explosion would have been cleared within a few minutes of the door being opened with the downcast wholly or partly blocked.

There were, it was true, injured men at the bottom of the downcast, and no means of getting them out at the time; but they might have been kept in fresh air while the afterdamp was passing out. Wherever more than two shafts were available, it ought to be possible to do something in this way, and with far greater prospects of success than by any other means. In most cases there would be only two shafts close together, and unless the separation doors and any air crossing near the shaft were made so as to resist explosions or be capable of rapid repairs, the stagnant afterdamp would remain on the main road or roads right up to within a short distance of the shafts. Rescue operations beyond this short distance would thus be impossible, or result disastrously, as at Darran, where no one seemed to have known how to test the air. If the main doors and air crossings were gone, every effort should at once be concentrated on repairing them, and thus getting the air through the workings. The importance of getting this done in the quickest possible way was evidently very great, and as soon as the air began to travel inward it should be followed up, particularly as fires might be discovered which might become dangerous unless dealt with promptly.

### Reversing the Ventilation

It might be found that the main road was so much blocked by falls, and in such a dangerous condition from the state of the roof, that there was great difficulty in getting in, and attempts to bring injured men out at once would be almost hopeless. In such a case it might be very advantageous to work inward from the return side. For this purpose it would be desirable to reverse the ventilation, and the provision of means for doing so seemed to me to be in any case advisable.

With a fire in the intake, following an explosion, reversal of the ventilation might, of course, prove invaluable. If rescue apparatus and trained men are available, they can be sent at once into the poisonous air away from the shafts to explore, extinguish any fires, and render what aid they can. Whether or not a rescue corps is available, it is usu-

*Abstract of a paper entitled, "Rescue Work in Connection with Mine Explosions and Fires," presented by J. S. Haldane, before the Mining Institute of Scotland.

ally much easier to get fresh air to the disabled men than to bring them out to fresh air. The main work of rescue will thus always consist in restoring the ventilation. The rescuers ought to be provided with means for testing the air at any point, and for this purpose a bird or mouse, inclosed in a box, shutting airtight, might be used, the box being capable of being connected to the exhaust of a rescue apparatus, so that the animal could be revived at once if necessary. A rescue corps might also perhaps be provided with light subsidiary apparatus for fixing over the faces of disabled men, and thus protecting them from afterdamp until they can be moved; but this matter has not as yet been properly considered.

In connection with all rescue work at explosions or fires, proper means of testing the air are, of course, very important. If nothing but a lamp is used, no one knows whether the air is dangerous or not. Hence, much danger may be incurred, as was the case, for instance, with the Darran explosion. On the other hand, there may be much wholly unnecessary waste of time, or equally unnecessary reliance on rescue apparatus, which are a great hindrance when work can be done without them. If small birds or mice are used for testing, these risks and delays can be avoided.

Dealing with the question of rescue operations at underground fires, Doctor Haldane held that in view of the dangers of a fire, means of reversing the ventilation ought to be provided at every mine. The subject was brought before the Mining Institute of Scotland many years ago by Mr. Allardice, who introduced a very simple arrangement for reversing the ventilation at the colliery under his supervision. This method is extremely efficient, as he (Doctor Haldane) could testify from personal observations. There were, however, other methods of attaining the same object. Failing the possibility of reversing the ventilation at once, or of cutting it off underground, the top of the downcast shaft might be closed, so as to cut off the air supply to the fire and the current of poisonous air round the mine.

### Desperate Measure

This might seem a desperate measure, but it appeared to give both the men and the mine a better chance than if the fire was simply allowed to burn on, and the smoke and the carbon-monoxide to be carried round the workings. The flames would be quickly extinguished and the time might be gained for reversing the ventilation before all in the mine were dead. In such a case, the risk of a firedamp explosion on reversing the current would need to be carefully considered and guarded against, however, and there were many mines where this risk would be far too great, so that direct reversal of the ventilation would be the only safe means. The ventilation might be reversed by turning water down the upcast shaft, and when once the current was turned, the hot air from the fire would pass into the downcast, and probably maintain the current in the right direction. Even so, the air would probably become explosive in many mines, so that nothing short of efficient reversal by fan ventilation would be at all safe. The distribution of the reversed air current would, of course, be very imperfect, but with proper care as regards the arrangement of the more important doors, a sufficiently good distribution could be obtained to enable the men and the mine to be saved.

In concluding his paper, Doctor Haldane said that it was, of course, impossible to lay down any hard-and-fast rules as to what ought to be done in connection with rescue operations at explosions or fires, as the circumstances vary in every case, and nothing can replace individual intelligence and decision on the part of the responsible officials.

Doctor Haldane, before inviting discussion on his paper, gave a demonstration of Professor Schafer's method of artificial respiration, and also illustrated by experiment how to recognize the presence of carbon-monoxide in blood. In closing his address, he explained the salient features of the device prepared by Sir Henry Cunynghame and Professor Cadman for detecting and estimating firedamp in mines without lowering the flame. He gave it as his opinion that the arrangement would be a useful one for a fireman in a naked-light pit in Scotland.

## Mine Rescue Station for Indiana

Indiana Correspondence

There is a spirited contest between four cities in Indiana for the mine rescue station that will serve the coalfield due to Congressional appropriation. They are, Terre Haute, Linton, Evansville and Vincennes. Terre Haute is without doubt the logical location, for within a radius of thirty miles from that city, more than 15,000 mine workers are toiling beneath the surface every day. The transportation facilities are good for reaching the majority of the mines in the State but notwithstanding these advantages other cities are pulling hard for the station. At present there are but four mine rescue stations in the United States, located at distant points. The State of Indiana, because of its large coal-mining industry, is keenly interested in the location of the station at a point best calculated to protect the lives of the men who work under the ground in the development of the mineral resources of the State. Terre Haute is the first city to offer a site for the station free of cost to the Government, and this point is favored by the mine workers association.

## Safety Lamps versus Naked Lights

Special Correspondence

The second report of the Royal commission which is investigating coal-mining conditions in England, says: "We think there is some force in the argument that the naked light has some advantage over the safety lamp on the ground of its giving better illumination, but we do not think it follows that the replacing of naked lights by safety lamps is calculated to increase the accidents from falls of ground. The available evidence tends to prove that this is not the case. Where a naked light is used, the miner no doubt forms the habit of ascertaining the safety of the sides and roof by his eyesight rather than by his ears, but when he is provided only with a safety lamp, he is bound to depend mainly on sounding, and for this reason, perhaps, he is disposed to exercise the greater caution.

There are, moreover, dangers in the use of naked lights which do not exist in the case of safety lamps. For instance, in naked-light mines, a number of accidents occur from the ignition of explosives by sparks from naked lights. In the two years (1907-8) for which statistics are available, there were 133 such accidents, causing the death of 7 persons and injury to 135 persons. The use of naked lights also seriously increases the risk of underground fire, and in this connection we may refer to the recent disaster at the Hamstead colliery, in Staffordshire, caused by the use of candles. Several witnesses expressed the opinion that discipline was better in mines where safety lamps are used.

### All Coal Mines Need Not Be Worked with Safety Lamps

We do not think, however, that there is any necessity for a rule that all coal mines must be worked with safety lamps, as suggested by some witnesses. There are many coal mines, especially small and shallow mines, where firedamp is rarely, if ever, found, and naked lights can be used without any risk. The use of naked lights also seems to us an advantage in very thick seams, such as those in Staffordshire, where the extra illumination given by the naked light is an advantage in examining the roof. On the other hand, there are a number of mines worked at present with naked lights, where gas is not infrequently found in quantities sufficient to cause accidents, and yet where difficulty is experienced by the inspectors in securing the introduction of safety lamps, owing to the indefiniteness of the general rule.

It is clear that in the case of mines where naked lights are employed, a much

wider margin of safety is necessary with regard to firedamp in the air than in mines where safety lamps are used. In the report by Messrs. Cadman and Whalley, there are a certain number of analyses showing the percentage of firedamp met with in the working places and airways of coal mines in which naked lights are used.

It appears that as a general rule, the percentage of firedamp in the return airways of naked-light mines is extremely low—seldom exceeding 0.3 per cent. The ventilation thus suffices, if properly utilized to dilute the firedamp, where any is present, to an extent which affords an extremely ample margin of safety. Examples were found, however, of cases where the air was so badly distributed that 2, or even 4 per cent. of firedamp was present in working places, or actually explosive accumulations were found in positions where they might easily enough be accidentally lighted.

We think it desirable that the act should contain some more explicit provisions as to the amount of firedamp permissible in naked-light mines and as to conditions which necessitate the introduction of safety lamps, and we recommend that it should be provided that in any seam where naked lights are used, men shall not be allowed to work or pass at places where the lowered flame of a saftey lamp shows and indication of firedamp, and that in case of disagreement, air containing anything exceeding a certain percentage of firedamp shall be taken as showing indications of firedamp.

We also think that where it is found on analysis or on testing with a special lamp, that the return air current at any point in a seam contains normally more than 0.5 per cent. of firedamp, the use of safety lamps in that seam should be made compulsory unless the ventilation can be so increased as to lower the proportion of firedamp below 0.5 per cent.

It seems to us that as a general rule there are great objections to the use of naked lights and safety lamps in the same ventilating district, and we think the provision in general rule 8 should be retained, with some modifications, to provide for those exceptional cases where a manager wishes to introduce safety lamps at a certain point of a mine merely as a temporary precaution and where the conditions do not render necessary the introduction of safety lamps throughout the ventilating district.

If, for any reason, some special piece of work, other than ordinary coal getting, has to be performed in air showing a cap on a safety lamp or otherwise foul, such work should only be permitted under the immediate supervision of an official of the mine or other competent person appointed in writing by the manager, and provided that all reasonable precautions are taken to guard against explosion and other dangers.

### Safety Lamps Injure Eyesight

In making the above recommendations we have borne in mind the superior light afforded by naked lights, and the probability of lessened injury to eyesight by the production of nystagmus, as well as the slightly diminished cost of working. It appears to us that if adequate precautions are taken, particularly in the distribution of the air and in the statutory examination of the air of the workings before and during each shift, naked lights can be used with advantage in certain classes of mines where firedamp is rarely met with. Our recommendations are designed to insure such a thorough distribution of the air as to reduce to a minimum the risks which hitherto have been associated in many mines with the use of naked lights.

We may point out here that the general rule says: "Where it is necessary to work the *coal*," and we understand that it has been held that this part of the rule would not apply to work in the stone or in shale. It appears to us that the intention of the act was to apply this provision to such work, and we think the point should be made clear.

There is another matter to which we wish to refer under this heading, namely, the withdrawal of safety lamps from a mine where they have been introduced. We think that safety lamps should not be withdrawn except for an adequate reason, and that the rule should be made more explicit in this respect. We recommend that safety lamps should not be withdrawn without the sanction of the inspector of mines, provided that if the owner of the mine considers that such sanction is unreasonably withheld, he may have recourse to the procedure fixed by the acts for settling such differences.

## Safety Laws Proposed for Coal Mines

Seventeen suggestions for better safety measures in mines have been suggested by the committee on mining legislation at the annual meeting of the Mine Inspectors' Institute of America, recently held at Chicago.

Some of the suggestions submitted and discussed were:

The establishment in each coal-producing State of a department of mines, mine inspectors to be selected by merit.

That mine maps on a uniform scale be made of each seam worked.

Provisions for the opening of new mines with regard to escapes, equipment and safety devices.

Provisions for traveling-ways, escape roads and safety chambers.

Provisions for the use of electricity in mines.

Methods of ventilating mines, air volume that is required and such other provisions needed to keep the mines in a healthful condition.

Selection of the person having charge of the ventilation apparatus.

Provision for fire protection inside and outside of the mine by means of a high-pressure water supply and the use of chemicals.

Use of noncombustible material for mine construction.

Installation of telephones.

Provisions for dealing with coal dust.

Explosives in mines, their use, preparation and the firing of shots.

Mandatory rules intended to promote the safety of the miners and lessen occurrence of accidents.

Provisions covering oil, lights and safety lamps.

Operators to furnish all needed means and supplies intended for the use and protection of miners.

Proper methods of mine discipline.

## COLLIERY NOTES

It is impossible to prescribe any general rule making the withdrawing of timber in coal mines compulsory in every case, for under certain circumstances such a practice would give rise to other dangers; however, timbers should be withdrawn wherever reasonably practicable. Where timber is withdrawn from the waste, it should be done by specially qualified men, and some contrivance for withdrawing the timber should be used.

One authority who is a student of the cost of mining, states that the price of labor is determined by natural factors; that it is an effect, not a cause, in the economy of mining; that in two neighboring districts with the same natural advantages, though the rate of wages may be different, the cost will be the same; the mines paying lower wages will have poorer men. This engineer further says that any difference in the rate of wages will be equalized by the supply and demand for labor as automatically as water runs downhill.

The use of battery firers and electric squibs is safer than that of ordinary miners' squibs, because shots are not fired until everyone, including the blaster, is in a safe position and the danger of hang-fires is entirely eliminated. It is claimed that by the use of electric squibs, more work may be done by a given amount of blasting powder; that any number of shots may be fired simultaneously; and that fumes from burning safety fuse and smoke from blasting powder are reduced to a minimum. Electric squibs should be connected in series, care being taken that connecting wires are clean and bright and that all joints are twisted tightly so that a good connection is obtained. It is well to wrap connections with insulator tape.

## PERSONAL

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Evans W. Buskett, of Joplin, Mo., is visiting New York.

Prof. L. D. Huntoon is on his way to Alaska, whence he expects to return during August.

H. Kilburn Scott has sailed from London for British East Afria on professional business.

M. H. Lyon, manager of the Gold Bug mine, in Mohave county, Ariz., is visiting New York and Boston.

Corey C. Brayton, who has been on a placer examination in New Mexico, has returned to San Francisco.

Dr. Donald Clark is now in charge of the metallurgical department of the University of Melbourne, Australia.

Dwight E. Woodbridge was in New York last week on his return from Cuba, and left for Duluth, Minnesota.

W. H. Radford, of San Francisco, is at present in Siberia for the Anglo-Siberian Company, Ltd., examining mines.

W. J. Pentland is now in charge of the milling operations of the Seguranza Mining ompany, at Zacualpan, Mexico.

Frederick H. Morley leaves Denver, Colo., July 8 for Vancouver, on his way to examine some mines in British Columbia.

Dr. H. A. Buehler has been reëlected director of the Bureau of Mines and Geology of Missouri for the next four years.

Ernest Russell Woakes left London for the Caucasus on June 17, to examine mines on behalf of Hooper, Speak & Feilding.

Frank Roberts, of Prescott, Ariz., recently inspected the Redeemer gold mine in the Manitou Lake area, Ontario, for the company.

H. E. T. Haultain, of Toronto, has received the appointment of professor of mining at Toronto University, the position being a new one.

George Ian McLean has been appointed comptroller of the Yukon Territory, and Lacklan T. Burwash, of Whitehouse, mining recorder for Dawson.

C. C. Ramsay has been chosen president of the Crucible Steel Company of America, succeeding Herbert Du Puy, who becomes chairman of the board.

Hartwell Jalonick is engaged in reconstructing the power plant and electrical equipment of the properties of Ramon Corral at Hermosillo, Sonora, Mexico.

S. H. Brockunier, of Wheeling, W. Va., has accepted the management of the Erie Consolidated Mines Company, of Graniteville, Cal. On July 1 he assumed charge.

Robert Wheatley, of Salineville, has been appointed mine inspector of the Twelfth district of Ohio; and Abel Elwood, of Ava, inspector for the Fifth district.

Milnor Roberts, dean of the School of Mines at Washington State University, Seattle, lately made a trip to the coal-mining district in Nicola valley, British Columbia.

Hon. Frank Cochrane, Minister of Mines for Ontario, is inspecting the North Hastings mineral district, accompanied by Professor W. G. Miller and E. T. Corkill, inspector of mines.

Pemberton Hutchinson, of Philadelphia, has been chosen president of the Westmoreland Coal Company and the Penn Gas Coal Company, in place of the late E. H. McCullough.

Daniel Parish Kingsford has been appointed superintendent of the New York Assay Office, to take effect Aug. 1. He has been a merchant and broker in New York for a number of years.

W. L. Honnold arrived at New York, July 3, from Johannesburg, Transvaal. He expects to be in the United States about three months. His address is at the Engineers' Club, New York.

Harley E. Hooper has resigned the management of the Copper Development Company at Nelson, N. Z., to accept a position on the metallurgical staff of the Progress Mines at Reefton, New Zealand.

Professor George J. Young, of the Mackay School of Mines at Reno, Nev., has returned from a trip lasting eight months, during which he visited mining schools in Europe, the United States and Canada.

Clarence W. Watson, president of the Consolidation Coal Company, has sailed for Europe, and will remain on the other side for some time. Vice-president J. H. Wheelwright will have charge during his absence.

Charles W. Wright, manager of the mines of the Societa di Pertusola in Sardinia, has returned to the United States for the summer and will be in Washington for some time, completing some work on the Geological Survey.

Edwin Letts Oliver has resigned his position with the North Star Mines Company at Grass Valley, Cal., and on July 1 opens offices at Oakland, Cal., as metallurgical engineer. He will have also a demonstrating plant of the Oliver continuous filter.

Samuel S. Arentz, formerly superintendent of the Nevada Douglas Copper Company, has been appointed general superintendent of the Nevada Douglas Copper Company and the Nevada Copper Belt Railroad Company, with office at Mason, Nevada.

E. B. Sturgis, for a number of years engaged in mining examination work, is now associated with the J. R. Alsing Engineering Company, manufacturer of grinding, crushing and pulverizing machinery. The new office of this concern is at 90 West street, New York.

## OBITUARY

Edmund P. North died in the hospital at Mexico City, June 29, from the injuries received at the Angangueo mine, as noted last week. He had been in Mexico only a few months as engineer for the American Smelting and Refining Company. Previously, he had been for several years with the Montana-Tonopah Company, at Tonopah, Nev. He was a graduate of Leland Stanford University.

John Alexander died at Malmesbury, England, June 10, aged 86 years. He was born in England, and came to this country when a young man. He was one of the pioneer oil refiners and is credited with refining some of the first oil treated. He was employed by Charles A. Dean at Cleveland, O., when the Drake well was drilled in 1859, and in 1861 established a small refinery at Pioneer Run for Dean. In 1863, Mr. Alexander returned to Cleveland and entered into a partnership with C. W. Schoefield, under the corporate name of the Great Western Oil Company. When this plant was sold to the Standard Oil Company in 1872, Mr. Alexander returned to England and lived there until his death.

Dr. James P. Wallace died on June 19 at Nogales, Ariz. He was taken seriously ill at Culiacan, Sinaloa, Mex., and upon the advice of physicians and friends, Mrs. Wallace started home with him to Colorado Springs, Colo., hoping the change would benefit him. He was widely known in mining circles throughout the West, having operated for 30 years in various places, and was, at the time of his death, operating in lands and mines in Mexico. He was the originator of the Nelson tunnel (now called Humboldt tunnel) at Creede, Colo. He was a member of the American Institute of Mining Engineers, and the Colorado Scientific Society. He was the author of "A Study of Ore Deposits for the Practical Miner."

## SOCIETIES and TECHNICAL SCHOOLS

*Missouri School of Mines*—L. S. Griswold has resigned the chair of geology and intends to give his entire time to consulting work. Guy Henry Cox, formerly assistant professor of mineralogy and petrography, has been placed in charge of the department of geology and mineralogy at that institution. J. W. Eggleston has been appointed assistant professor of geology and mineralogy. He is a graduate of Amherst and of Harvard and has had an extensive experience in teaching geology and mineralogy in the Colorado School of Mines and Harvard University.

# EDITORIAL CORRESPONDENCE

Reports From Our Own Representatives on Important Events From Many Important Mining Centers of the World

## San Francisco

*July* 1—The company running the dredges in the vicinity of Folsom, Sacramento county, have not heretofore had any trouble with municipal authorities about muddying the rivers, but at present there is an agitation against it in Sacramento. The mayor of that city is stirring up the health officials because mud is found in the waters of the American river, and an investigating committee from Sacramento is making an examination of conditions. Most of the dredges at Folsom are working on old vineyard group at some distance from the river, and none are working in the river bed proper. Some of them are on the high hills, several miles from the stream, and all work in their own individual ponds or basins. The company has taken care that no muddy water reaches the stream.

Some of the oil men strongly protest against storing their oil in large quantities so as to avoid overproduction, because in that event they must pay for both production and storage and have to wait for their money, while meantime increased stocks are accumulating. Indeed, some fear that oil dividends may stop for a while, because the companies cannot at once dispose of their oil. The oil market is dull just now, but it is considered that the main overproduction is due entirely to the enormous and steady output of the Lakeview gusher, which is spouting between 48,000 and 50,000 bbl. daily.

A suit has been commenced at Auburn, in Placer county, California, in which a woman brings action against the Southern Pacific to compel the company to pay for mineral found in a right-of way. The complainant alleges that the sale of the land did not convey the subsequently developed mineral deposits.

## Denver

*July* 2—The Künzel smeltery at Buena Vista is exciting more than usual interest, especially in the San Juan region, where the smeltery agent is buying ores, paying for the gold, silver, copper and zinc contents, based on a smelting charge of $4 per ton, and as the general character of the San Juan ores is an aggregation of these minerals in a silicious matrix, the new metallurgical departure is naturally interesting, both from a financial as well as a metallurgical point of view. The new works is expected to blow in about July 25.

The signs are now strongly evident that the land and irrigation craze has reached its limit, and is on the downgrade, and mining is once more to be the leading industry of the State. Like all other so called "booms," the fakers jumped in and brought disrepute on the business. Many companies with high-sounding titles failed to finance their schemes; some were up against Government withdrawals for power; in others there were three or four claimants for the same water rights; others again were apparently little short of direct bunco games; and for this and other reasons it is apparent that before the close of the year, the mining game will be in full swing again. The mining committee of the Denver Chamber of Commerce has been organized, and Franklin Guiterman, manager of the American Smelting and Refining Company, here has been elected chairman. He will make special efforts to further the mining revival in the State, and will send a representative to every camp in Colorado.

As an example of good, healthy gold mining, one may instance the Elkton Consolidated, on Raven hill, in the Cripple Creek district. For the year ended May 21, 1910, the production was 21,567 tons of ore of an average value of $24 per ton, the total gross valve being nearly half a million dollars, and the net return $369,573. The company subscribed and paid $70,000 toward the completion of the deep-drainage tunnel, and has $268,647 in the treasury. The shareholders have just received their checks for the bimonthly dividend of 1c. per share, and an extra dividend of ½c. per share, amounting to $37,500. The El Paso Gold King, in Poverty gulch, in the same district, has also paid the June dividend of 2c. per share on its 1,000,000-share capitalization, or $20,000; and the Mary McKinney has likewise paid a dividend at the rate of 1c. per share for June.

That the Cripple Creek deep-drainage tunnel is nearing its goal may be gathered from the fact that the El Paso Consolidated company, the property of which is the first to be unwatered, has let the contract for connections of 350 ft. in depth and 56 ft. of a crosscut. The breast of the drainage tunnel is now in the hardest granite, and the footage made is not over 12 ft. per diem.

The production of the mines of the Cripple Creek district for June amounted to 61,515 tons, having a bullion value of $1,249,303, or an average of $20.30 per ton, about 30c. per ton lower than for May. The New Portland mill appeared in the list of reduction works treating Cripple Creek ores for the first time last month, 8863 tons of an average value of $2.46 having been handled. The cost of treatment has not been made known to the public, but it is stated to be about $1 per ton.

## Butte

*July* 1—The Anaconda Copper Mining Company has brought suit against the Monidah Trust Company, James A. Murray, William Climo, Sampson Hoar and others, to secure an injunction against the defendants preventing them mining any ore from the Bell and Speculator claims and to get $100,000 damages for the ore it is alleged they have already taken from those claims. The Ticon is a small fraction in the Butte district, lying near the Bell and Speculator claims and is owned by James A. Murray, and Climo & Hoar are engaged in working it under lease from Murray. The complaint alleges that the defendants are working through the Ticon shaft orebodies which apex within the Bell and Speculator claims and that $100,000 has already been taken from those claims by the defendants. A temporary restraining order has already been issued and a hearing will soon be had to determine whether an injunction *pendente lite* shall issue. About a year ago Murray and Climo & Hoar brought a suit against the Anaconda company in which the same question was involved but the suit was not pressed.

A number of Butte stockholders in the Butte & Superior company have written to Secretary Walter S. Hore requesting additional information regarding the proposed reorganization scheme and protesting against any action being taken until the situation is more thoroughly explained.

The case of Hugh Magone against the Butte & Boston for damages has been transferred from Powell to Deer Lodge county, on motion of the defendant. Magone is suing the company for $26,000 damages, which he alleges were done to his crops by reason of the pollution of the waters of Silver Bow creek by the defendant company's smelting plant.

At the annual stockholders' meeting of the Tuolumne Copper Company in Butte, June 20, the following were elected directors: Edward Hickey, N. J. Bielenberg, R. J. McDonald, M. E. O'Rourke, J. A. Clifford, Daniel Shields and T. E. Murray. The financial statement for the year ended May 31, 1910, shows that gross returns from ore were $272,142.28

and the balance of cash on hand on May 31, 1910, was $308,146. The net earnings were $112,619. No dividend was declared. The report states that considerable time and money were expended in developing and defining the apexes of the company's several veins, and that it was proved beyond a doubt that all veins claimed by the company actually belonged to them. General Manager Sheehan reports that since June 21, 1909, a 1½-compartment shaft has been sunk 150 ft. on the north vein and is being continued. Another shaft, known as No. 3 has been sunk 50 ft. also on the north vein. During the year 4644 ft. of crosscuts and drifts have been run. The 1200- and 1400-ft. levels have been thoroughly prospected and the 800- and 1000-ft. levels are now being given attention. He recommends that the main shaft, now down 1400 ft., be sunk to 2000 feet.

## Salt Lake City

*July* 2—The Utah Fuel company has installed 12 sets of Draeger rescue apparatus in its coal properties in Utah and Colorado. Nine of these machines are used at Sunnyside, Castle Gate and Winter Quarters, Utah. State Inspector J. E. Pettit has been conducting a training class in the use of the Draeger helmet, at the camps. Each helmet is arranged with two oxygen tanks, which contain enough oxygen to last two hours. The classes will be conducted every two weeks under the most adverse conditions, so that the company will have a sufficient number of men familiar with the apparatus to respond in case of an emergency. In this event, three men will be equipped and sent into the mine. When a regular corps of trained man is obtained, it is intended to install stations underground, where they can be reached in case of an accident.

The phosphate fields of Idaho, Utah and Wyoming are described by Prof. W. M. Waggaman in a bulletin recently issued by the Department of Agriculture. The phosphate region comprises parts of northeastern Utah, southeastern Idaho and southwestern Wyoming, and is one of the largest phosphate areas known. At present the phosphate is not being extensively mined, but some from the Utah-Idaho beds is sent to San Francisco for the manufacture of fertilizer. The product sells for about $17 per ton. There is a growing demand for fertilizer in the West, especially in California, where the consumption is steadily increasing, and according to Professor Waggaman, the Western fields will gradually come into prominence with the depletion of the more accessible deposits.

## Goldfield

*July* 2—A temporary order has been issued by District Judge Averill, restraining the Round Mountain Mining Company from "disposing of any of its real property or making any unreasonable expenditures of money." The injunction will hold pending the settlement of a $600,000 damage suit, in which J. F. Davidson seeks to recover for ore alleged to have been wrongfully extracted from Round Mountain-Sphinx ground.

The gross production in the Goldfield district for the first half of 1910 is approximately $7,140,000. The Consolidated, of course, is the largest producer, with $6,500,000. The Florence company produced $580,000, while the remaining $60,000 comes from leasers and small company operations.

## Deadwood, S. Dak.

*July* 1—The Homestake company proposed to remove to the surface the several existing underground blacksmith shops, which include eight drill-sharpening machines and the car-repair shop, now on the 600 level. The reason for this step is that the dust and carbonic acid, introduced by the coke furnaces, although removed at once by adjacent shafts, promise to become a factor in ventilation when the 1850 and lower levels are opened up. While time is saved by sharpening drills underground, and the hoisting and lowering of them is thereby avoided, there are other factors to be considered. The better light and ventilation at the surface make an appreciable difference in the efficiency of the men, and it is probable that a more uniform tempering of the steel will result from this change. Electric forges have been tried in South Africa, but apparently have not met with unqualified success in work of this class, and it seems likely that the fumes from the fused chlorides used in electric furnaces would be nearly as troublesome underground as those from coke fires, if a large number of forges were installed.

A number of air-feed stope drills have been on trial for several months. Three types of drill have been selected for further tests, and will be used for some months longer, to compare their endurance and relative cost of upkeep, before a final choice is made of the pattern to be adopted.

A complete equipment of Draeger oxygen helmets and accessories has been lately acquired, and a sufficient stock of oxygen is kept on hand to allow of continuous work by four men in the case of an underground fire.

An employees' benefit association is shortly to be inaugurated, after being under consideration for some months. It will be on lines similar to those which have proved satisfactory at mines in Montana, Idaho and Michigan. The employees will each contribute $1 monthly, and the Homestake company will add at least $1000 per month besides paying all office expenses.

In the Northern Black Hills, the Homestake, Golden Reward and Mogul companies are operating their mines and mills steadily with nonunion labor. The smaller properties are mostly idle or working on a limited scale. The silicious mines (those working the Potsdam ores) are much in need of a method by which the "blue" or unoxidized ore of comparatively low grade can be economically treated. With the gradual exhaustion of the oxidized ore amenable to cyaniding, and of the richer ore which can be shipped at a profit, the problem of the blue ore carrying $7 or less per ton, and which will not yield to amalgamation or cyaniding, is becoming of increasing importance.

## Cobalt

*July* 5—According to the official returns, the output of Ontario mines for the first three months of 1910, amounted to $6,309,171. The Cobalt camp produced practically 50 per cent. of this total, having sent out 6,399,927 oz. of silver and 78 tons of cobalt, with a total value of $3,055,641. The shipments from the camp for the first quarter were 7155 tons, including 1061 tons of concentrates. This is an increase of 14 per cent. over last year.

The chairman of the Temiskaming & Northern Ontario Railway commission states that the engineer has advised against building spur lines into Gowganda and Porcupine. The presence of the railway's surveyors in Porcupine is of no special significance, as it is the policy of the Government to secure a right-of-way into any new camp, to avoid trouble in the future, if it should decide to build. The available tonnage from Gowganda is comparatively small and although the possibilities of Porcupine are very bright, sufficient development has not been done to warrant the construction of a branch.

A number of New York capitalists have offered to purchase a 60 per cent. interest in the Timmins-McMartin claims in Porcupine for $1,000,000. They also further agree to put $500,000 in the treasury for working capital, the only stipulation being, that the present owners agree to make the remaining payments on the original purchase price of the properties. This offer has so far not been accepted.

A most amazing story of high grading in connection with the Lucky Godfrey mine at Elk Lake, has just come to light. Last April a carload of ore, valued at about $40,000, was shipped from the property. When it reached the smeltery the sacks were found to contain only low-grade material, with a total value of only a few thousand dollars. The high-grade ore had been stolen from the sacks, and low-grade and waste rock substituted. Several employees at the mine have been arrested, but it is probable that the ore is scattered all over the country by this time, and that the company will get very little of it back.

# THE MINING NEWS

Reports of New Enterprises, New Machinery, Installations, Development Work and Property Transfers The Current History of Mining

## Alaska

Since the opening of navigation about $1,500,000 has been started from the Tanana district. The last shipment of gold from Fairbanks June 7, was $450,000.

Maj. W. P. Richardson, president of the Alaska road commission, announces that work will be begun at once on the government roads from Seward to the new Haiditarod goldfields.

*Northland Development*—This company is doing work on the property near Big Harbor, and expects to have a cargo ready for shipment before the summer is over.

*Cliff*—A rich pocket was struck recently and one day's cleanup was $13,000. Scores of prospectors are in the hills around this mine near Valdez.

*Union*—The cleanup on this property on 17 Goldstream near Fairbanks, for the week was $12,000. The company will start operation on a new block.

## Alabama

### Fayette County

Operations continue active in new natural-gas district. The Providence Oil and Gas Company, of which Dr. G. B. Crowe is president, has now 11 wells drilled, and is preparing to drill deeper, hoping to strike oil also. Arrangements are almost completed to start work on a 12-in. pipe line to carry gas to Birmingham.

### Jefferson County

It is reported that the Universal Portland Cement Company, a subsidiary of the Steel Corporation, will build cement works at Calera, 30 miles from Birmingham.

Work has been begun on the plant of by-product coke ovens which the Woodward Iron Company has decided to build at Dolomite, near Birmingham.

## Arizona

### Cochise County

*Calumet & Arizona*—A new orebody of sulphide ore, averaging 4 per cent. copper, is reported opened in the 1450-ft. level.

### Mohave County

*Union Basin*—This company, operating the Golconda zinc mine in the Union Basin district, has paid its seventh dividend of 1c. per share in about a year. Some interesting figures are given by Manager J. Boyle, Jr., in a bulletin just issued to the stockholders. The total net smelter receipts to June 1 are a little over $239,000, of which about $190,000 have been produced in the past year. The present slump in the price of zinc is offset by the increase in the gold and silver in the ore as well as the rise in the percentage of zinc, which is now averaging 49 per cent. as against 47 per cent. of a year ago. In the first five months of 1910 the mine shipped 4395 tons of ore, which netted $87,000 above freight and smeltery charges. The total expense of handling this tonnage of shipping ore and about twice as much milling ore, together with the costs of permanent improvements made in this time, amount to $65,800, leaving a net profit on shipping ore alone of about $21,000. The net profit on the milling ore is estimated at $40,000, making a total net earning of about $65,000 for the five months. Mining in the fourth level of the Golconda is disclosing an oreshoot, which is larger and richer than previously in gold and silver. Development is being kept considerably ahead of stoping, the present reserves constituting about two years' supply of ore. The Prosperity tunnel, which will eliminate hoisting almost entirely, is making good headway with advances of 150 ft. per month. There are still about 500 ft. to be driven to get to the Golconda. Enough water has been developed for a 75-ton concentrating mill, which it is expected to erect soon.

### Pima County

*Imperial*—The company will prospect the El Tiro ground adjoining. Drilling on the Imperial has proved porphyry orebodies of moment, which it is believed extend to the El Tiro holdings. The work is in charge of Meade Goodloe and H. C. Smith.

## California

### Amador County

*South Eureka*—The cleanup for June at this Sutter Creek mine was $65,000. The company is running 40 stamps of its own mill and 20 stamps of the Central Eureka. Twenty stamps are being added to the company mill.

*Bunker Hill*—Drifting for the vein on on the 1950 continues. The cleanup for last month was $20,000.

*Kennedy*—On the 2800 level of this mine at Jackson, exceptionally rich rock has been found recently. The orebody at the 3400 level is 12 ft. wide.

### Calaveras County

*Ophir Consolidated*—New York men have obtained from J. W. Nuner a bond on this mine at Rich Gulch and are completing the tunnel.

*Moser and Lamphear*—It is reported that Mr. Baker has obtained in the East capital to reöpen these mines near San Andreas.

*Newman*—This mine, owned by the Levaggi estate, is showing up well and has 500 tons of ore ready to be worked in the 10-stamp mill.

### Inyo County

*Poverty Hill*—A test run is being made at this mine and the new plant will soon be steadily operating.

### Kern County

A rich strike has been made in the Lucky Star, of the Bremmer group, operated by A. McClure, A. F. Dedrick and T. R. Petersen, in the Stringer district. The high-grade ore was found at 80 feet.

### Mono County

*Crown Lead*—At this mine, four miles from Coulterville, 30 men are at work under Superintendent Bernard Greeney. Electric power has recently been installed and the 20-stamp mill has been reconstructed.

*Champion*—P. George Gow has two shifts of men at work on this mine, two miles from Coulterville.

*Tyro*—At this mine, three miles from Coulterville, the unwatering of the shaft is nearly completed and when this is finished the 10-stamp mill will start.

*California Quail*—This company will begin work on the Quail mine, near Coulterville, soon.

### Nevada County

In the Graniteville district, the Birchville mine is working 60 men and running 10 stamps; the Erie has 40 miners and is running its 30-stamp mill day and night; the Ancho has 20 men and a 10-stamp mill; the Republic has 12 men and is running a 10-stamp mill.

*Cassidy*—The company has been incorporated to work the Cassidy mine, near Grass Valley. C. M. Wilson and L. A. Armstrong are incorporators.

*Metropolitan*—C. L. Wilson, of this company, at Moores flat, has a large force of men at work on the several properties, and a 20-stamp mill will be erected on the Middle Yuba river.

*Cincinnati*—This old mine is being reopened by the North Star Mines Company, A. D. Foote, manager. The property was worked with some success in early days.

*Montana*—W. G. Brown has put in new machinery, including a hoist, at this mine in Willow Valley, near Nevada City.

SHASTA COUNTY

*Mountain Copper*—This company is sending four trains of five cars each, daily from the Iron Mountain and Hornet mines to its reduction plant, near Martinez. The Little Nellie, on the Iron Mountain road, is shipping 100 tons of ore, carrying gold, to the same place, weekly.

YUBA COUNTY

*Tarr*—This company is building a "mud settler" for the ditch on Wolf creek, Nevada county. About 40 men are engaged in cleaning out the big ditch which is to convey water to the Blue Point mine at Smartsville, owned by the company.

## Colorado

CLEAR CREEK AND GILPIN COUNTIES

*British*—John Taylor, of Denver, has acquired this property near Central City and will operate it.

*Scotia*—This mill, at Silver Plume, will be operated by Frank Graham under lease, treating Burleigh dump rock.

*Jersey Blue*—This Daily district property has installed machinery.

*Sun and Moon*—The mine is taking out rich ore from Seaton mountain.

*Des Moines*—This Russell Gulch mine has been sold by John Ross for $60,000.

*Pappoose*—This claim on Bellevue mountain, has been leased to A. Anderson and W. W. Tanner.

*Kentuck*—The Ophir Mountain Consolidated company has opened a 10-in. streak in this mine through the Central tunnel, which carries gold, silver and copper to the value of $81 per ton.

*Frontenac*—A contract has been let for a crosscut and raise from the Newhouse tunnel to connect with Addudell mine, which recently passed into the hands of London people. The crosscut will be about 260 feet.

GUNNISON COUNTY

*Brant Independent*—The company is preparing for resumption of operations at mine and mill.

HINSDALE COUNTY

*Yellow Medicine*—This property, near Lake City, has been sold by William O'Brien for $100,000, to a company with headquarters at Hamilton, Ont.

*Belle of the West*—This mine has commenced shipping.

*Pelican*—The labor difficulties have been settled and finances provided for operation.

LEADVILLE—LAKE COUNTY

It is reported that a strike of free gold ore has been made in a group of claims in the St. Kevin district by Anton Rosse, the owner, who has been prospecting his claims for 30 years, having driven with his own hands the last 400 ft. of the tunnel in which he made the discovery. The extent is not yet known.

*Griffin*—This mine, in the St. Kevin district, is producing 10 to 15 tons per diem of high-grade gold and copper ore. Last week 50 tons were hauled to the smeltery. Redmond Cody is the manager, and he is operating through the Midale tunnel.

OURAY COUNTY

The Mineral Farm property will resume in charge of John Erickson. The Legal Tender, adjoining, is developing. The Plata Cache will resume development. The Mono-Baltic smeltery, at Ironton, expects to start smelting this summer. The Angel company has let a contract for work on the property south of Ouray.

SAN JUAN DISTRICT

*Gold Nugget*—This mine in Maggie gulch is installing electric power for compressor and will develop with machine drills.

*Kittemac*—This mine continues steadily in operation. The Clarke vein yields an average of 8 ft. of sulphides and is opening up continuous orebodies east and west from the Little Joe tunnel.

*Yukon*—This property has its compressor plant installed and is overhauling the mill to treat ore on the ground. It is reported that the company has encountered zinc on vein No. 15, 2500 ft. from the tunnel portal.

*Minnehaha*—This property, above Gladstone, has ore in which sulphides of lead, copper and zinc, predominate. A winze sunk 160 ft. between levels is in ore.

*Silver Ledge*—The mine is letting contract to sink the main shaft 200 feet.

SUMMIT COUNTY

*Buffalo*—This placer property, near Dillon, has started operations. It is proposed to use shovels and land dredges. L. Kingsbury is in charge.

*Keiling*—This dredging company is operating successfully in French creek, working the tailings of the Mecca lot.

*Reliance*—This dredging company is working on French gulch.

*Colorado*—This dredging company is operating in Swan river, with good results.

TELLER COUNTY—CRIPPLE CREEK

*Free Coinage*—At the 250-ft. level of the Carper shaft, at the intersection of the Pinto and Bison claims, a rich strike has been made by Jesse Adams, lessee. The streak is about 8 in. wide, and carries coarse free gold.

*Hiawatha*—George Greenfield, leasing on this Beacon Hill mine, put a shot in the granite wall, and opened up 18-in. of sylvanite ore.

*Prince Albert*—It is stated that a small sacked shipment of selected ore made by Edward Cookerly, lessee, gave returns of 50 oz. gold to the ton. He is now sending out a carload shipment estimated at about 2 oz. per ton.

*Maggie*—Samples taken from the breast of a new shoot opened at the 350-ft. level gave returns of 2 oz. gold per ton.

*Cresson*—By the middle of this month, this mine will again be in full operation.

*Midway*—Twenty-eight tons of ore shipped by Safford Brothers, lessees on this mine, between Bull and Ironclad hills, returned $50 per ton.

## Idaho

*Jumbo*—This mine in the Buffalo Hump district, has been leased to J. W. Reese, of Salt Lake, and will be operated.

## Indiana

DAVIESS COUNTY

A representative of the executive board of the Indiana Mines of District 11 is trying to settle the strike at the Washington-Wheatland mine near Washington. The miners walked out recently when four were discharged for riding the front of an engine instead of a car provided.

GIBSON COUNTY

*Bicknell Coal Mining Company*—This company has increased its capital stock by $15,000. It is prepairing to sink additional shafts and otherwise carry out proposed development. Thomas M. Byers is president.

GRANT COUNTY

The lease of 4500 acres west of Marion, reaching over into the southern part of Huntington county, by high officials of the Ohio company, is causing interest and is taken to mean the reopening of the oilfields in this section.

JAY COUNTY

One of the best oil wells drilled for many months was completed by the Fulton Drilling Company, of Portland. The well is in Bear Creek township and after being shot produced over 100 bbl. the first 20 hours.

SULLIVAN COUNTY

*Hamilton Oil and Gas Company*—This company, of Sullivan, has drilled in its third well. Pay sand has been reached and the well looks good for 50 bbl. a day. The pumps are at work on Nos. 1 and 2 and each is producing 20 bbl. a day.

## Kansas

*Quebradilla*—This company has bought the lease of Rohrbaugh Brothers adjoin-

ing on the Glick land at Galena and one mill will be erected for both properties. The first "turn-in" of this company last week amounted to 100,000 lb. of lead and 100,000 lb. of zinc.

## Kentucky

*Eclipse Mining Company*—This company, with office in Louisville, has opened a fluorspar deposit in Crittenden county. The company has a shaft 115 ft., with three entries into the spar, which shows a fissure vein from 18 to 40 ft. wide. The company recently erected a mill. A railroad will be built from Marion.

## Michigan

### Copper

*Hancock*—No. 2 vertical shaft has discontinued sinking temporarily to permit of the erection of the steel shaft house. The winze or subshaft put down on the No. 3 lode, tributary to No. ' shaft, is bottomed at the 18th level, while the main working crosscut at this point between the two shafts will be holed through soon. The construction of the permanent surface equipment is going forward satisfactorily and when completed will be one of the best in the district.

*Oneco*—This company is operating two drilling outfits and has started an entirely new cross section of its tract. No. 8 hole is down about 750 ft. without encountering any mineralization, and No. 9 about 200 feet.

*Mayflower*—This company is operating two prospecting drills in making an exploratory cross section.

*Contact*—President Fay, of this and the Elm River company, has sent a statement to the Elm River company, wherein he outlines the plan of taking over the Elm River property. The Contact is capitalized at 200,000 shares of $25 par value. The Elm River shareholders will be given share for share of the Contact company, providing the shareholders of Elm River subscribe for an additional 50 per cent. of Contact stock, at $2 per share. This will give the Contact company $100,000 and 50,000 shares of stock in the treasury.

### Iron

*Ohio*—This mine, west of Michigamme, owned by the Niagara company, has been closed, the company drawing its supply from the adjoining Portland mine.

*Cleveland Cliffs*—The electrification of the Marquette range mines of the company is proceeding with satisfactory headway. There are two big generating plants, one at Negaunee and one at Princeton. The former station is now furnishing power to the Maas, Negaunee, Cleveland Lake, Cleveland Hard Ore, North Lake and Barnes properties. The Princeton station is serving the Princeton No. 1 and No. 2 properties and the Stephenson mine. The only important work still to be done in connection with the transmission system is the installing of motors and other equipment at various mines and shops.

*Bates Iron Company*—This company has been organized to operate the Hall-Yackel lands in the western Menominee range, controlled by Ladenberg, Thalmann & Co., of New York.

## Missouri

*Old Dominion*—This company has completed the sinking of a new shaft at the John L. mine north of Webb City which will greatly increase the capacity.

*United Zinc*—This company has leased 100 acres in the Lehigh camp at Carl junction and is drilling and sinking shafts. Some of the richest ore in the district has been struck.

*Joplin Royalty Company*—This company is drilling its 600 acres south of Joplin.

*Chapman & Lennan*—The Dinger mill of this firm on the Bradford-Kansas City land at Webb City was recently burned. The mill will not be rebuilt but that of the Bradford-Kansas City company will be leased.

*Mary E.*—This company has completed its mill at Spring City and has started the operation of the mine.

## Montana

### Butte District

*Anaconda*—By the recent transfer of Washoe Copper Company's property to the Anaconda company, promissory notes from the Washoe company to the Amalgamated company amounting to $8,036,-291 were discharged. These notes were given in part for the $7,200,000 loan from Amalgamated to Washoe which was used to construct the smeltery at Anaconda. The Anaconda company as a part of the merger agreement, will discharge all outstanding indebtedness of the companies which it absorbs. A deed transferring to the Anaconda company all the property of the Alice Gold and Silver Mining Company has been recently filed with the county clerk of Silver Bow county. The claims transferred are the Alice, Magna Charter, Curry, Valdemere, Rooney, Hawkeye, Reef, Fraction, Magnolia, Boston, Midnight, Cottonwood, Plover No. 1, Saukie West, Saukie East, Rising Star, Walkerville, Paymaster, Ray Walker, Wood Yard, Blue Wing, Neptune, Gussett and Thesus. The deed is signed on behalf of the Alice company by John D. Ryan, president, and J. W. Allen, secretary, and on behalf of the Anaconda company by B. B. Thayer, president, and C. F. Kelly, secretary. A deed from the Butte & Boston Mining Company to the Anaconda company transferring all property of the former company to the latter has also recently been filed. The deed is signed by James Phillips, Jr., president, and F. P. Addicks, secretary, of the Butte & Boston company, and B. B. Thayer, president, and C. F. Kelly, secretary, of the Anaconda company.

*Butte Central*—The unwatering of the 500-ft. shaft was recently finished, having consumed 31 days. A 300-ton concentrator will be erected on the property before any mining will be done.

### Jefferson County

*Eagle's Nest*—The group of 29 gold-quartz claims, 6 miles east of Alhambra, is being operated by Robert A. Bell who plans a tunnel 6080 ft. along the vein.

*Corbin Copper*—Stephen R. Dow, president, R. M. Edwards, general manager, and A. L. Wyman, secretary, are inspecting the property. The 100-ton concentrator will be started at once. In the Bonanza tunnel a 20-ft. winze recently sunk has encountered a body of silver ore.

### Missoula County

*King and Queen*—It has been definitely announced that a mill will be built on the property, the first unit of which will have a daily capacity of 75 tons.

## Nevada

### Esmeralda County

A new district has been discovered about ten miles west of Goldike.

*Goldfield Consolidated*—The inclined belt conveyer has been placed in commission and is supplying ore to 80 stamps. The tonnage during the last half of June increased materially.

*Florence*—The mill is steadily reducing 150 tons daily, with an average reported extraction exceeding 95 per cent.

*Goldfield Annex*—The three-compartment shaft is down 920 ft. At 1000 ft. a a lateral will be driven to tap the vein opened at 800 feet.

*Bonnie Clare*—The 100-ton mill for which Gold Mountain operators have been waiting several months is almost completed. The ore is first stamped, amalgamated, slimed and concentrated. The tailings are cyanided and filtered through a continuous revolving Oliver filter. Eight miles of railroad and two aërial trams will be built during the summer, the mill to be operated on custom ores meantime.

*Goldfield-Alamo*—In accordance with the State law, President J. H. Miller has filed a semi-annual statement. It shows 2212 tons of ore extracted; gross value $159,242; smelting and marketing $51,-998; mining $64,551; paid in dividends $42,000. The mine is in good shape and a continuance of dividends is expected.

### Humboldt County

*National*—A shipment valued at $140,-000 was made by the Stall lease, which is now producing about $5000 per day. On other National ground the same rich body of ore has been found that the

Stall lease has. The property is in the northern part of the county, about the middle of Sec. 33, T. 46, N., R. 39 E. There are about 1000 people in the district.

LANDER COUNTY

*Jack Pot*—A 60-h.p. gasolene engine and machine drills have been installed. The main shaft will be sunk to 400 feet.

*Austin-Manhattan*—Mill material is arriving. The work of retimbering is being pushed.

*King Midas*—W. E. Hales is driving a tunnel on this property, at Clear Creek in the Reese River district. A mill is planned.

LYON COUNTY

*Mason Valley*—Jules Lebarthe, in charge of construction of the new smeltery at Wabuska, and Duncan McVichie, vice-president and general manager of the Copper Belt railway, have just completed an inspection of the Mason Valley territory. They report satisfactory progress in grading and construction.

*Bluestone Extension*—A large block of treasury stock has been sold to Texas capitalists and extensive development will be instituted at once. The property consists of 180 acres adjoining the Bluestone on the north. The latter is said to have 3,000,000 tons of 3 per cent. copper ore blocked out.

NYE COUNTY

*Tonopah*—The regular quarterly dividend of 25c. per share and an extra dividend of 15c. has been declared, payable July 21. The distribution will amount to $400,000, making a total of $1,100,000 for the current year, and $6,050,000 to date. The treasury will contain considerably over $1,000,000 after this disbursement. June shows the same tonnage with an increase of nearly $2 in the average content over the next best month this year.

*Montana-Tonopah*—Crosscuts sent out in both walls of the Martha and Triangle veins in search of parallel veins, are exposing excellent blocks of stoping ground on the 465- and 615-ft. levels.

*Tonopah-Belmont*—The June mill report shows 220 tons handled daily with an extraction of 92 per cent.; 45 bars of bullion weighing 3375 lb. resulted from the melt of 2 weeks' cyanide precipitates.

*Bullfrog West Extension*—C. D. Wilkinson, chief engineer for George Wingfield, is making a thorough examination and sampling of the property. Wingfield is the controlling factor in the John S. Cook bank, which has a mortgage on the extension, and if the results of the examination are satisfactory operations may be resumed on a big scale.

WHITE PINE COUNTY

*Giroux*—When the pumping station on the 1200-ft. level of the new shaft is completed, three pumps will be installed; one with a capacity of 1200 gal. per min. and two with a capacity of 600 gal. each. After the pumps are installed, crosscutting will commence toward the 1200-ft. level of the Alpha, at present flooded and which must be pumped before extraction of the ores of the Alpha claim can commence.

## New Jersey

Taking of testimony is going on in the suit pending in the Court of Chancery against the New Jersey Zinc Company. The suit is brought by R. Wayne Parker, of Newark, for himself and the Rutherford estate, under the lease of the Parker mine at Franklin furnace in Sussex county. The questions involved are the system of mining in use, and the method of weighing the ore on which royalty is payable under the lease. On the latter point the Parker claim is that the ore should be weighed as it is taken out of the mine, and before milling or concentration.

## New Mexico

*Bennett-Stephenson*—The court has approved the contract between Frank T. French, receiver, and J. I. McCullough, secretary of the company, for the purchase of the property. Possession was taken July 1, and active operations will be commenced soon.

## New York

It is understood that as a result of a report by the health commission of the State of New York the State authorities will proceed in the courts against several oil-refining, chemical and metallurgical companies operating on Staten Island, N. Y., and Constable Hook, N. J. It is alleged that damage results from the smoke and fumes from these plants.

## Oregon

BAKER COUNTY

*Oregon Freegold*—This company is in the market for a 5-stamp mill. W. J. Hughes, Baker City, is manager.

*Mammoth*—The property is being operated under A. Bodleson, of Sumpter. Work will continue on a larger scale.

*White Points*—This company is obtaining good results in opening a group near Sumpter.

JOSEPHINE COUNTY

*Oriole*—New machinery is being installed in this mine, owned by Corey Mattison and associates.

*Gold Hill*—This company, B. H. Harris, president, has started work on a large power plant which will be of great value to the mines of the Gold Hill district.

## Pennsylvania

Hugh R. Sackett and G. W. Wilson, of Pittsburg, have secured 700 acres of coal land on the Redstone vein, near Irwin, in Westmoreland county. They intend to open a mine as soon as possible, and to build 50 or 100 coke ovens.

## South Dakota

The Westinghouse Electric Company, already operating four mica mines near Hill City, has acquired the Crown mine in the same district, and will proceed at once to equip and work it.

*Gold Dollar*—The company is negotiating a sale of the property, near Deadwood.

*Seabury-Calkins*—This property in the Carbonate district, will be unwatered and prospected by the Black Hills Financial and Development Company, Robert Bunce, president.

*Tinton Tin Mining Company*—The mill, in the Nigger Hill district, is now being run one shift, about 40 tons of one-per cent ore being crushed per day by rolls and passed over jigs and Wilfley tables. It is proposed to add Frue vanners or concentrators of that type. The property is owned by Montreal interests, which propose to develop extensively.

## Utah

JUAB COUNTY

*Gemini*—The electric pump which broke down several months ago and was shipped east for repairs is being reinstalled on the 1600-ft. level. The pump has a capacity of 300 gal. of water a minute and works jointly with a pump on the 1900 level. Work will be resumed on the lower levels, when the pump is installed. At present ore is being mined on the 1450 and 1600 levels. The output of the Ridge & Valley mine, which is being operated through the Gemini workings is being taken from the 1500 and 1600 levels.

*Eagle & Blue Bell*—Sinking the shaft from the 200-ft. level is in progress, and raising from the 1000-ft. level to connect with this work will soon be started. Three shifts are employed in sinking, and two shifts will be used in raising.

*Bradley*—The gasolene hoist on this company's claims in North Tintic is in commission. The gallows frame and hoist house are completed. S. E. Evans is superintendent.

*Victoria*—Work of retimbering the old shaft is being pushed preparatory to sinking from the 550- to 1000-ft. level. When this shaft is completed ores will be taken out on the Eureka side, and the miners will live in Eureka instead of on the Mammoth side of the mountain.

*Opex*—Three miners were killed by an explosion of dynamite on the 1925-ft. level, June 25. Nine others in a rescue party were overcome by powder fumes, which had filled the lower workings.

*Iron Blossom*—Drifting is being done on the 600-ft. level to reach the gold ore opened on the 500. The No. 1 or South shaft is down 1675 ft., and drifting will be started when the 1700 level is reached.

*East Tintic Consolidated*—Work has been resumed on this property, and a con-

tract given for drifting from the bottom of the shaft.

*King William*—It is reported that operations will be resumed. The claims adjoin the Centennial-Eureka, Grand Central and Eagle & Blue Bell.

*Lower Mammoth*—Leasers on the east end of the 1000-ft. level are reported to have struck a good body of ore.

SUMMIT COUNTY

*Daly-Judge*—Electrical equipment is being installed in the mill, and the transmission line from the mine to the mill is being strung. Power will be furnished by the Snake Creek Power Company. Milling operations have not been interrupted.

*Little Bell*—A statement sent to stockholders with the last dividend shows that the earnings for the quarter ended May 1 were lighter than for the two preceding quarters. This was due to the inability to market ore on account of the impassible condition of the roads. Work was carried on uninterruptedly, and much milling ore developed. A mill is now being built. The receipts on three lots of ore were $14,675, which made a cash balance of $72,916. Disbursements for the quarter, including purchase of new machinery and dividend, were $35,684. Cash on hand June 1, was $37,232.

## Canada

BRITISH COLUMBIA

*Consolidated*—The company smelted in May 35,687 tons of copper ore and 5446 tons of lead ore. The product was gold, $276,171; silver, $152,182; copper, $59,615; lead, $84,614; total, $575,582. The total product for 11 months is $5,420,737.

ONTARIO

The shipments from Cobalt for the week ended June 24 are: Kerr Lake, 420,199 lb.; Nipissing, 463,540; La Rose, 272,790; Chambers-Ferland, 134,300; Crown Reserve, 124,170; Temiskaming, 60,000; Silver Cliff, 42,460; Coniagas, 58,100; Hudson Bay, 55,000; Right-of-Way, 60,990; Millerett (Gowganda), 57,340; total, 1,748,889 pounds.

*Dominion*—This reduction company will erect a 100-ton customs concentrator on Cross Lake.

*O'Brien*—A rich oreshoot has been fund in No. 16 vein in the diabase below the conglomerate.

*Buffalo*—The cyanide plant is making an extraction of 66 per cent. on 13 oz. slimes.

*Nipissing*—For the five months ended May 31 this company produced $1,001,156 silver at a cost of $161,228.

*Temiskaming*—There are now two veins producing high-grade ore at the 400-ft. level. The mill is handling 100 tons daily.

*York-O'Brien*—A new vein has been cut on the 100-ft. level.

*Trethewey*—Ore is being mined from the new shaft. The new concentrator is running full capacity.

*Royal Westmount*—Six good veins have already been uncovered this season. A new steam plant will be installed in the fall on the Elk Lake property.

*Crown Reserve*—The drift at the 200-ft. level is in the conglomerate and is being run up Kerr lake parallel to the Kerr Lake Company line to cut the veins located by diamond drill. The Victoria vein struck on May 24 south of the main vein is holding in width and silver content, being high-grade ore, one assay yielding .6000 ounces.

*Mikado*—At this gold mine in northwestern Ontario, operations have been resumed in charge of Captain Nickerson.

## Mexico

CHIHUAHUA

*Compañia Minera de las Plomosas*—This French-Mexican company has acquired the zinc property in the eastern part of the State, owned and operated for several years by Jose Lago. Jose Luis Requena, of Mexico City, is president and C. Clerc, manager. The property has been a regular shipper of high-grade carbonate ore and with the systematic development planned by the new owners will probably show increased production.

*Mexico-Orient Mining Syndicate*—This company, with £25,250 capital, has been formed in London to acquire properties from the Stilwell interests along the Mexico & Orient railway. Three copper properties are under option to the syndicate which proposes to develop them.

*Batopilas*—Cable from London says the organization of the Batopilas Mining, Smelting and Refining Company, Ltd., of London, to take over the lease of certain groups of mines of the Batopilas company, of Mexico, has been completed. Shares of the English company to the number of 50,000 have been underwritten and listed on the Paris bourse. Stock of the English company to the amount of 75 per cent. is owned by the Batopilas company. It is proposed to make similar arrangements for working other mines of the Batopilas Mining company, and also for starting new mines throughout the company's concession, which covers 61 sq.m. The more extensive operations are expected to assure an increased revenue.

*San Francisco del Oro*—This Parral company has begun the construction of a spur railway from the mine to Moline, on the Parral & Durango. Progress is being made on the new mill. W. S. Harrison is in charge.

*Cherokee*—At this property, in the San Julian camp, south of Parral, active mill construction is under way and it is expected that the plant will be operative in early fall. Harold D. Higgins is manager.

HIDALGO

*La Cruz*—A rich strike is reported at this property in the Santa Rosa district at Actopan, about an hour and a half west of Pachuca.

*Dos Carlos*—This property, recently sold to a London syndicate through Charles Greunwade, will start work under direction of E. K. Mitchell. The property adjoins the Santa Gertrudis and is now known as the South Santa Gertrudis.

MEXICO

*Buen Despacho*—Capitalization of this company, of El Oro, is being increased to $1,000,000, represented by 20,000 shares, $50 each, 8000 shares of which will be controlled by Pichon, Durand & Co., Paris bankers, who will list the security upon the Paris bourse. This same Paris company has an option to increase the capitalization of the Victoria, of El Oro, to $1,100,000, and to list the shares on the bourse.

SINALOA

*Butters Copala*—F. M. Perry, general manager of Mines Company of America, has examined the mines, 60 miles east of Mazatlan. It is understood Mr. Perry will take the management of the Copala group of low-grade properties.

*Panuco*—This mine, in the Copala district, is milling 40- to 50-oz. ore to a monthly profit of $20,000, which is paid to its Spanish owners. This property is operated entirely by Mexicans and is owned in Spain.

*Santa Lucia*—The Palo Verda mine, a gold-silver property, 55 miles northeast of Mazatlan, has a mill and cyanide plant ready for erection. Charles Thomas, of Los Angeles, is owner.

SONORA

*River*—This copper company, in the San Antonio district, is developing; it is owned by Lake Superior men. F. X. Pellis is in charge.

*Hudson Consolidated*—This company, in the San Antonio district, has encountered good ore in the main prospecting shaft, and is planning development under management of Herman Wendler.

*Duluth-Moctezuma*—The Monte Cristo mine is shipping a car a month. C. H. Jones is local manager.

## Africa

RHODESIA

Gold production in May is reported at 53,419 oz., or 818 oz. less than in April. For the five months ended May 31, the total was 248,768 oz. in 1909, and 264,289 oz., or $5,462,854, in 1910; an increase of 15,521 oz. Other production reported for the five months was 95,697 oz. silver, 29 tons copper, 316 tons lead, 18,164 tons chrome ore and 56 tons asbestos. Coal production from the Wanku mines was 69,856 tons.

# THE MARKETS

## Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics

## Coal Trade Review

*New York, July* 6—Coal trade in the West is still disturbed in spots, and the strike troubles are not quite over, though most of the mines are working, except in northern Illinois. In some districts they are working pending a final settlement, but there is not much doubt that this will be reached. In Indiana only one point is still in dispute, but this will probably be settled by conference this week. In the Pittsburg district the contract has been completed by the conference committee, and is submitted this week for final acceptance and signature.

The present position of the trade is another proof of the capacity of the coal mines and the possibility of over-production. With important districts idle there has been no scarcity of coal at any time; and with a large part of the Illinois mines closed, the large consuming centers like Chicago and St. Louis report receipts of coal heavy enough to bring down prices to a low level.

In the East the seaboard bituminous trade is quiet, almost dull. Buying is slow, and consumers do not seem to be troubling themselves about winter stocks yet. All the mines serving the seaboard trade are working, except in the Irwin district in Pennsylvania.

The anthracite trade is quiet and steady as usual. Shipments of hard coal to the Lake trade are about up to the average.

*Illinois Coal Strike*—A joint conference of the miners and operators of the Springfield and Carterville districts has been called for July 6. The miners are anxious to go to work, though the operators seem to be independent and are not inclined to make any concessions. It is about an even break as to whether the difficulties will be settled at this conference or not.

### Coal Traffic Notes

Coal shipments out of the Kanawha river, four months ended April 30, were 582,468 short tons in 1909, and 453,620 tons in 1910; decrease, 128,848 tons.

Coal delivered by the Virginian Railway to tidewater at Sewalls Point, five months ended May 31, was 20,269 short tons in 1909, and 284,741 in 1910; increase, 264,472 tons. The road was only partly opened last year.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad, year to June 27 were 190,505 tons in 1909, and 300,492 in 1910; increase, 109,987 tons.

Coal production in Kentucky for the year 1909 is officially reported at 10,296,145 tons; an increase of 492,768 tons over 1908, but a decrease of 139,916 tons from the 1907 report.

## New York

### Anthracite

*July* 6—The market is steady, and if anything, is inclined to be dull. Steam-coal demand is light so far as current business goes.

As noted last week 10c. came off the summer discounts on July 1. Schedule prices of large sizes are now $4.55 for broken and $4.80 for egg, stove and chestnut, all f.o.b. New York harbor points. For steam sizes, current quotations are: Pea, $2.95@3.25; buckwheat, $2.15@2.50; No. 2 buckwheat or rice, $1.65@2; barley, $1.35@1.50; all according to quality, f.o.b. New York harbor. The lower prices are usually for washery coals.

### Bituminous

The market continues dull, and hardly any improvement could be expected in a week broken up by a general holiday. Buying continues, both locally and for New England trade, but the call is for cheap grades of coal and the better grades are not active. A few contracts are closed from time to time, but most of this business is out of the market.

There is no improvement in prices. Good Miller vein coal goes at $2.50 per ton, f.o.b. New York harbor, while gas coal is sold at about $1 per ton at mines. In some cases sales have been made lower, where coal is under demurrage.

Car supply is good generally, but summer business is interfering a little with transportation, so that there are some delays in getting coal to tide.

In the coastwise trade vessels are in a little better supply, but freights generally hold well to the recent figures. From New York, rates are 75@80c. to points around Cape Cod. Large vessels from Philadelphia get 75c. to Boston, Salem and Portland; 65c. to Providence and the Sound.

## Birmingham

*July* 5—The coal situation in Alabama grows interesting with a large number of orders in hand and others in sight, warranting a steady operation of mines. The only thing now in the way of a larger production is labor. New Orleans coal dealers have been in the Birmingham district recently investigating possibilities in the way of handling large quantities of coal. The tonnage now sent to New Orleans and the Lousiana market averages about 50,000 tons of coal per month. Alabama coal companies are interested in the New Orleans Coal Company, which has apparatus for handling coal from railroad cars and barges into steamships.

Coke production in Alabama is being improved wherever possible, the demand being strong.

## Chicago

*July* 4—Steam producers continue to take eagerly the fine coals that reach this market and the supply of these could be increased without overstocking the market. Lump is at its usual disadvantage in summer. Indiana screenings are the most in demand of all coals in sight, bringing $2@2.20, while run-of-mine from the same State is 10@15c. less and lump brings about the same as run-of-mine.

Coals from east of Indiana are in good demand, but not booming. Their price is against them, when Indiana coal is available at present prices. Smokeless, however, finds increased sale in run-of-mine at $3.15 and Hocking is in fair demand. Anthracite sales are very light, though fair for the time of the year.

Considerably more coal for the country outside Chicago is being sold through city houses, showing that the pressure of empty bins is stronger outside the city than within it. The country demand is largely for lump and tends to balance the abnormal city demand for screenings.

## Cleveland

*July* 4—Local trade is exceedingly dull. Domestic trade is dead, and steam-coal orders come in very slowly. Lake trade is also dull, and not enough coal is reaching Cleveland to keep carriers busy. A good deal of Ohio coal is going to Chicago.

Prices are unchanged. Middle district coal, f.o.b. Cleveland, is quoted at $2 for 1¼-in.; $1.85 for ¾-in.; $1.75 for run-of-mine; and $1.65 for slack. No. 8 and Cambridge districts, 15 or 20c. higher. Youghiogheny, $2.45@2.50 for 1¼-in.; $2.30@2.35 for ¾-in.; $2.20@2.25 for run-of-mine; and $1.80@1.85 for slack.

## Indianapolis

*July* 4—After nearly two months of intermittent meetings at Terre Haute, the miners' and operators' joint scale committee has decided to refer the one point of disagreement to a joint convention called for July 7. This point is the clause in the wage contract imposing a

fine of $1 a day on miners who go on strike without first exhausting the arbitration method provided in the working contract. In the temporary contract under which the miners of the bituminous field are now at work, the clause is eliminated and there have been 20 local strikes in two months. All other questions have been settled and this problem alone remains for consideration by the joint convention. Should the joint convention fail to come to an agreement, according to a prominent member of the Operators' Association, the temporary contract existing between the miners and operators will become void, and operations at the mines will cease.

Notwithstanding the firm standing taken by each side, there are many who believe that the point will be decided satisfactorily at the joint convention. The miners are all at work on full time and at good pay. They are anxious that these conditions shall continue; however, the officials and agitators may force a suspension of work, which will prove very unfortunate at this time.

### Pittsburg

*July* 5—Demand for coal from local manufacturers has eased off a trifle, but the Lake trade is taking all the coal that can be found, so that shipments and prices are maintained, and we continue to quote: Mine-run and nut, $1.20@1.25; ¾-in., $1.30@1.35; domestic 1½-in., $1.50; slack, 80@85c. per ton.

*Connellsville Coke*—The holiday, with the prolonged festivities common to foreign-born labor, has created a mild scarcity of prompt furnace coke, and has sent prices up. On Friday, sales were made without difficulty at $1.65, the price quoted as the market in last report; on Saturday that price was bid without finding coke and today several sales have been made at $1.75. No interest is manifested in contract coke and the quotation is largely nominal. Foundry coke is moving rather slowly.

We quote standard Connellsville coke as follows per net ton: Prompt furnace, $1.75; contract furnace, $1.75@1.85; prompt foundry, $2.10@2.25; contract foundry, $2.25@2.50 at ovens.

The *Courier* reports the production in the Connellsville and lower Connellsville region in the week ended June 25, at 393,476 tons, a decrease of 11,000 tons, and shipments at 4122 cars to Pittsburg, 5630 cars to points west and 925 cars to points east, a total of 10,677 cars.

### St. Louis

*July* 4—The market for the past week has been a great disappointment to the coal man. Prices have broken badly and the movement of coal is slow. This is undoubtedly due to the tremendous tonnage which has been on the market all month. As far as tonnage is concerned the month of June, 1910, is the record breaker over any previous June. This goes to show what a tremendous overproduction is possible in Illinois. With two-thirds of the State shut down the remaining one-third produced enough coal to supply the entire demands after a strike period when everyone was short and produced a glut on the market.

The railroad buying, which was very heavy, ceased during the last week of the month, which accounts for the break in prices. It is the opinion of a number of operators that prices will improve after July 5 for the reason that railroads are bound to come into the market again and also that a number of mines will be shut down temporarily at least during the first part of July on account of the new State mining law. A number of mines have not been able to install all the necessary equipment to comply with the law and while work along that line has been pushed as rapidly as possible, not to interfere with the tonnage, yet there is still a great deal to be done. About 50 per cent. of the mines are closed down on this account.

Current prices are as follows for the St. Louis market:

| | Mine. | St. Louis. |
|---|---|---|
| Illinois, Standard: | | |
| 6-in. lump and egg | $1.50 | $2.02 |
| 2-in. lump and nut | 1.10 | 1.62 |
| Mine-run | 1.00 | 1.52 |
| Screenings | 1.00 | 1.52 |
| Trenton: | | |
| 6-in. lump and egg | 1.90 | 2.42 |
| 3-in. nut | 1.75 | 2.27 |
| Staunton or Mt. Olive: | | |
| 6-in. lump | 1.70 | 2.22 |
| 2-in. nut | 1.60 | 2.12 |
| Mine-run | 1.50 | 2.02 |
| Screenings | 1.50 | 2.02 |
| Carterville: | | |
| 6-in. lump or egg | 1.50 | 2.17 |
| 3-in. nut | 1.50 | 2.17 |
| Screenings | 1.25 | 1.92 |
| Pocahontas and New River: | | |
| Lump or egg | 1.50 | 4.00 |
| Mine-run | 1.10 | 3.65 |
| Pennsylvania Anthracite: | | |
| Nut, stove or egg | ..... | 6.65 |
| Grate | ..... | 6.40 |
| Arkansas Anthracite: | | |
| Egg or grate | 3.35 | 5.35 |
| Coke: | | |
| Connellsville foundry | ..... | 5.40 |
| Gas house | ..... | 4.50 |
| Smithing | ..... | 4.15 |

Anthracite opened slowly for the month of July. Shipments have been curtailed somewhat and very little coal has been on demurrage. About the middle of the month it is expected that the Fall movement will set in. The new circular of $6.75 per ton on chestnut, stove or egg and $6.50 on grate, went into effect July 1.

## FOREIGN·COAL·TRADE

*United States Coal Exports*—Exports of coal and coke from the United States, with coal furnished to steamships in foreign trade, five months ended May 31, long tons:

| | 1909. | 1910. | Changes. |
|---|---|---|---|
| Anthracite | 1,097,588 | 1,280,222 | I. 182,634 |
| Bituminous | 2,860,568 | 3,446,486 | I. 585 918 |
| Total exports | 3,958,156 | 4,726,708 | I. 768,552 |
| Steamer coal | 2,448,307 | 2,650,422 | I. 202,115 |
| Total coal | 6,406,463 | 7,377,130 | I. 970,667 |
| Coke | 405,270 | 374,904 | D. 30,366 |

Canada took this year 3,311,216 tons of coal, or 70.1 per cent. of the total exports. Cuba took 343,502 tons of coal. The coke went chiefly to Mexico and Canada.

*United States Coal Imports*—Imports of coal and coke into the United States, five months ended May 31, long tons:

| | 1909. | 1910. | Changes. |
|---|---|---|---|
| Anthracite | 3,115 | 42 | D. 3,073 |
| Bituminous | 572,760 | 756,439 | I. 183,679 |
| Total coal | 575,875 | 756,481 | I. 180,606 |
| Coke | 76,644 | 46,461 | I. 30,183 |

Canada furnished this year 649,426 tons of coal and nearly all the coke; Australia, 51,008 tons of coal; Japan, 50,538 tons of coal. Imports are chiefly on the Pacific Coast and in the far northwestern States.

*Welsh Coal Prices*—Messrs. Hull, Blyth & Co., London and Cardiff, report current prices of Welsh coal as follows, on June 24: Best Welsh steam, $4.02; seconds, $3.72; thirds, $3.66; dry coals, $3.72; best Monmouthshire, $3.60; seconds, $3.48; best steam smalls, $1.98; seconds, $1.62. All prices are per long ton, f.o.b. shipping port, cash in 30 days, less 2½ per cent. discount.

## IRON·TRADE·REVIEW

*New York, July* 6—The iron and steel markets are feeling the usual midsummer dullness, and the season when almost everyone is taking stock and figuring out profits—or losses—on the half-year's business. At the same time there is some buying going on, but it will not be active until users of iron begin to get at some idea of their requirements for the rest of the year.

In pig iron there is more discussion of prices than actual buying. Foundry iron in Eastern territory has reached rather a low point, and furnaces are not making concessions asked of them as freely as they were. Southern iron is being offered rather freely at low figures. Orders continue to come in steadily and the total of June business appears to have been larger than was generally expected or realized.

In finished material structural steel continues to be the leader. Large contracts are not plenty just now, but a considerable aggregate of small orders is being placed. In fact, it is the small orders in almost all lines that are holding up the trade. The feature of the business is that in the absence of what may be called spectacular orders, few realize how large a total trade is being done. Moreover, this seems likely to

keep up for some time. Jobbing trade is very good for the season.

Export business has been good through the year, as shown by the official reports given elsewhere.

*Canadian Iron Merger*—The consolidation formed originally as the Canadian Steel Corporation, has assumed the name of Steel Company of Canada, Ltd.

The merger is capitalized at $25,000,000, and the various companies will be represented by the following amounts of stock: Hamilton Steel and Iron Company, $9,300,000; Canada Screw Company, $4,000,000; Canada Bolt and Nut Company, $2,100,000; Montreal Rolling Mills Company, $7,650,000. C. S. Wilcox, Hamilton, Ont., is president.

## Baltimore

Exports for the week included 39,550 lb. zinc dross to Liverpool; 3050 tons steel rails to Brisbane, Australia. Imports included 16,700 tons iron ore from Cuba.

## Birmingham

*July* 5—The Southern iron market is a little quiet right now, though there is a hopeful feeling expressed on all sides. Reports have it that iron has been selling again at $11.50 per ton, No. 2 foundry, but in the offices of the companies it is denied that iron can be had under $12 per ton. Brokers are authority for the statement that $11.50 per ton is the price. The aggregate sales during June were satisfactory. The production has been curtailed a little, another furnace having been blown out. The home consumption and the shipments of iron are steadily improving but more iron can be handled than at present. Special brand iron continues to sell well.

There is no change in the steel market. The Southern Iron and Steel Company is not operating its plants to full capacity. The Tennessee company has its steel plants going about as steadily as during the past three or four months.

Home consumption is holding up wonderfully in Southern territory.

## Chicago

*July* 4—Conditions in the iron market indicate that the dullness normally present in summer is now on. Sales of pig iron are almost wholly of small lots for third-quarter delivery, with fewer melters concerned about fourth-quarter or 1911 requirements. The aggregate of sales is respectable, however. Consumption of iron and steel goods continues large.

Southern No. 2 brings $11.50@12 Birmingham—$15.85@16.35 Chicago — the lower price being current on early deliveries. Northern No. 2 is easy of purchase at $16.50@17. The Southern furnaces appear to be stronger and less anxious for sales. Northern charcoal is $18.50@19. Coke is in moderate demand with the best Connellsville holding to $5, Chicago.

## Cleveland

*July* 2—Shipments of ore hold up better than was expected, and the June total will be good. Shipments to furnaces, however, are a little slow. No new sales of ore reported.

*Pig Iron*—Some inquiries for foundry are being received and there have been fair sales of basic pig, with one lot of bessemer iron. Prices are a little uncertain, but $16.65 can be quoted for bessemer; $15.25@15.50 for No. 2 foundry; $15.85 for No. 2 Southern; $14.65@14.90 for gray forge; all f.o.b. Cleveland.

*Finished Materials*—Not much new business is reported, but specifications on contracts have been coming in well. Some good sales of trolley rails and steel ties are reported, and a few contracts for structural steel. Iron bars are selling better than anything else. A good deal of shading is reported on sheets.

## Philadelphia

*July* 5—Eastern pig-iron makers are not quite so willing to stock up iron rather than sell it by shading prices, as they were a week or two ago. New negotiations have just started, which may deplete stocks enough to make furnacemen feel easy. Large sales of basic pig have been made in this territory. Scarcely any business has been done in foundry, and buyers are not in the market. New England inquiries made some little while ago are not being followed up. Forge iron is extremely dull in sympathy with bar iron. Southern offerings have not been repeated and comparatively little business was done during June by Southern makers. No. 2X foundry is quoted today at $16.50 for Northern and $16 for Southern, and gray forge at $15.50, with offerings still open for Southern forge at 50c. less.

*Steel Billets*—Nothing has been closed in billets.

*Bars*—Bar iron orders could be placed at concessions which would not have been accepted a month ago. Business has fallen off, both in stores and mills.

*Sheets*—Dullness is characteristic of the market. The general tendency is to buy the very least possible and wait.

*Pipes and Tubes*—The consumption of all lines of pipes continues heavy and the industry shows more than in some other branches.

*Plates*—No orders of consequence have come to the mills, and even some contemplated orders for this month have been side tracked. Prices are unchanged, but a shading is regarded as the logical outcome of conditions.

*Structural Material*—No orders of consequence have been booked, but there is enough in the way of possibilities to maintain quotations on small orders. The business in ordinary construction in buildings has been quite active this summer and building operations calling for steel are larger than last year.

*Scrap*—The scrap market is entirely neglected.

## Pittsburg

*July* 5—While the iron and steel market is inexpressibly dull as to actual new business, specifications continue quite good and on the whole the market is in better position than was expected. The chief drag at present appears to be the general financial position, of which the declines in Wall street are a symptom. It is believed that much of the present hesitancy is due to this cause, rather than to the season, although the season would be a sufficient explanation of the present dullness.

No important price changes have occurred but it is accepted on all hands that the trend, if any, is downward. Pig iron, of course, has had a long decline, and is practically stationary now, but finished-steel products are likely to go down rather than up, at least for a month or two.

A number of the independent steel interests have closed their plants for inventory and repairs, including the Pittsburg Steel Company, La Belle Iron Works, Youngstown Sheet and Tube Company and Republic Iron and Steel Company. The Pittsburg Steel Company's plant will be down all of this month, while the Republic steel plant will resume operations on Monday after nine days' idleness, the other plants mentioned being down for probably two weeks. The iron mills are down pending settlement of the wage scale, which may not occur for some time. The Amalgamated Association and Western Bar Iron Association were in conference on the iron-mill scale at Detroit from Tuesday to Saturday of last week, but even without a five days' conference did not reach an agreement, and the conference adjourned without fixing a date for another conference. As the Republic Iron and Steel Company intended to be guided by the arrangements made with the Western Bar Iron Association it is held up also by the disagreement, while it is improbable that any settlement will soon be reached between the Sons of Vulcan, the other organization, and the mills which have hitherto signed its scale.

While the feeling in the market is far from cheerful the outlook is for distinctly improving business after the summer, for all the bad news seems to be out.

*Pig Iron*—The market is almost bare of inquiry. Prices show no quotable change, but it is quite possible that present quoted prices on basic and bessemer iron could be shaded slightly on a firm offer for prompt delivery. Quotations are, f.o.b. Valley furnaces, 90c. higher delivered Pittsburg: No. 2 foundry, $14.50; forge, $13.75; malleable, $15;

basic, $14.75; bessemer, $15.75. The basic pig-iron average for June is announced at $14.70, Valley, against $15.04 in May, and $17.48, the high point on the recent movement, in November last. The bessemer average is announced at $15.62, against $16.20 in May and $19, the high point in November, December and January. The Ironton market is reported as firmer, $15 at furnace being the minimum quotation for No. 2 foundry, while a few weeks ago $14.75 was done and even shaded. The southern market has held its own of late, and stands at $11.25, Birmingham, for No. 2, $11.50 for third quarter, and nearly all sellers quotating $12 for fourth quarter.

*Steel*—The market may be slightly easier, but it does not seem to be quotably lower. There is relatively little demand at the moment. We repeat former quotations: Bessemer billets, $25@25.50; sheet bars, $26@26.50; open-hearth billets, $28@28.50; sheet bars, $28.50@29; rods, $30.50@31, all f.o.b. maker's mill, Pittsburg or Youngstown.

*Ferromanganese*—The market is quiet and not quotably changed. Prompt, $39.50; forward, $40@40.50, Baltimore, freight to Pittsburg being $1.95 per ton.

*Sheets*—A few of the sheet mills have closed for inventory and repairs. Demand has slackened off somewhat but is fairly good considering the season. Nominal prices continue to be shaded about $2 a ton, remaining as follows: Black, 2.40c.; galvanized, 3.50c.; painted corrugated roofing, $1.70; galvanized, $3. Blue annealed sheets are firm at the regular price of 1.75c. for No. 10 gage.

### St. Louis

*July* 4—Pig iron continues to be slow. Very little interest is being shown. A few small lots have been purchased but not a contract worth mentioning has been closed in 60 days. The price of $12 per ton Birmingham or $15.75 St. Louis remains the current figure.

## FOREIGN IRON TRADE

*United States Foreign Trade*—Exports and imports of iron and steel in the United States for the five months ended May 31 are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

| | 1909. | 1910. | Changes. |
|---|---|---|---|
| Exports | $61,072,957 | $76,439,655 | I.$15,366,698 |
| Imports | 10,232,375 | 17,557,019 | I. 7,324,644 |
| Excess, exp. | $50,840,582 | $58,882,636 | I.$ 8,042,054 |

The leading items of imports and exports were as follows, in long tons:

| | Exports 1909. | Exports 1910. | Imports 1909. | Imports 1910. |
|---|---|---|---|---|
| Pig iron | 16,081 | 33,155 | 48,280 | 106,036 |
| Scrap | 9,914 | 7,899 | 2,200 | 55,116 |
| Billets, blooms, etc. | 50,265 | 5,290 | 5,279 | 21,892 |
| Bars | 30,603 | 46,604 | 6,328 | 17,704 |
| Rails | 99,781 | 164,440 | 380 | 5,682 |
| Sheets and plates | 63,889 | 117,376 | 1,449 | 3,343 |
| Structural steel | 36,617 | 59,258 | 2,599 | 6,701 |
| Wire-rods | 7,883 | 13,767 | 4,849 | 9,166 |
| Wire | 59,318 | 67,539 | ..... | ..... |
| Nails and spikes | 19,062 | 25,187 | ..... | ..... |
| Tinplates | 3,701 | 5,939 | 24,163 | 30,764 |
| Pipe and fittings | 61,386 | 61,110 | ..... | ..... |

Imports of wire not given in quantities; values, $398,648 in 1909, and $655,538 this year.

*United States Iron Ore Movement*—Imports and exports of iron ore in the United States, five months ended May 31, long tons:

| | 1909. | 1910. | Changes. |
|---|---|---|---|
| Imports | 447,833 | 1,065,851 | I. 618,018 |
| Exports | 85,416 | 121,940 | I. 36,524 |

Of the imports this year, 633,630 tons were from Cuba, 325,311 tons from Europe and 101,910 tons from Newfoundland.

Imports of manganese ore for the five months were 77,633 tons in 1909, and 96,808 tons in 1910; increase, 19,175 tons.

## METAL MARKETS

*New York, July* 6—The metal markets generally show little change; that is, they are inclined to be quiet and with no considerable changes in prices.

### Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

| Metal. | Exports. | Imports. | Excess. |
|---|---|---|---|
| Gold: | | | |
| May 1910 | $ 717,678 | $ 3,143,338 | Imp.$ 2,425,660 |
| " 1909 | 11,171,265 | 2,263,721 | Exp. 8,907,544 |
| Year 1910 | 47,917,384 | 14,812,614 | " 33,104,770 |
| " 1909 | 55,487,891 | 17,767,857 | " 37,720,034 |
| Silver: | | | |
| May 1910 | 4,170,754 | 3,354,715 | Exp. 816,039 |
| " 1909 | 4,428,848 | 3,857,388 | " 571,060 |
| Year 1910 | 22,506,835 | 18,593,349 | " 3,913,486 |
| " 1909 | 23,854,629 | 18,532,753 | " 5,321,876 |

Exports from the port of New York, week ended July 2: Gold, $400; silver, $859,300, chiefly to London and Paris. Imports: Gold, $118,550; silver, $138,496, from the West Indies, South America, Australia and Japan.

Movement of gold and silver through the port of San Francisco, five months ended May 31:

| Exports: | Coin. | Bullion. | Total. |
|---|---|---|---|
| Gold | ..... | $1,970,208 | $1,970,208 |
| Silver | $1,500 | 2,842,000 | 2,843,500 |
| Imports: | | | |
| Gold | 16,068 | 731,460 | 747,528 |
| Silver | 560,005 | 364,962 | 924,967 |

The exports of gold were all made in the month of January.

Gold and silver movement in France, four months ended April 30:

| | Imports. | Exports. | Excess. |
|---|---|---|---|
| Gold | 127,809,000 F. | 90,551,000 | Imp.Fr. 37,258,000 |
| 1909 | 204,331,000 | 24,462,000 | Imp. 179,869,000 |
| Silver | 42,458,000 | 60,121,000 | Exp. 17,663,000 |
| 1909 | 47,359,000 | 44,172,000 | Imp. 3,185,000 |

Imports of copper and nickel coins, 17,000 fr.; exports, 328,000 fr. face value.

Exports of silver from London to the East from Jan. 1 to June 23, reported by Messrs. Pixley & Abell:

| | 1909. | 1910. | Changes. |
|---|---|---|---|
| India | £2,870,900 | £2,757,000 | D. £ 113,900 |
| China | 1,155,100 | 1,115,500 | D. 41,600 |
| Straits | 82,800 | ..... | D. 82,800 |
| Total | £4,108,800 | £3,870,500 | D. £ 238,300 |

India Council bills in London sold at an average of 15.99d. per rupee.

*Gold*—The quotations on the open market in London are unchanged at 77s. 9d. per oz. for bars and 76s. 5d. per oz. for American coin. Arrivals were divided between London and Paris. No exports from New York.

*Platinum*—Business is good for the season, and prices have again been advanced, following the increase abroad. Dealers ask $33 per oz. for refined platinum, and $37.50@38 for hard metal.

Our Russian correspondent writes under date of June 25, that a considerable increase in prices is to be noted. The stocks brought over from last year are exhausted, and dealers begin to feel a scarcity of metal, so that a further advice is not unlikely. At Ekaterinburg small lots are quoted at 6.70 rubles per zolotnik—$25.19 per oz.—for crude metal, 83 per cent. platinum. At St. Petersburg 26,000 rubles per pood—$25.48 per oz.—is quoted for the same grade.

SILVER AND STERLING EXCHANGE

| June-July. | 30 | 1 | 2 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| New York | 53⅛ | 53¼ | 53 | ..... | 53¼ | 53⅞ |
| London | 24 11/16 | 24 5/8 | 24 5/16 | 24 3/8 | 24 3/8 | 24 1/2 |
| Sterling Ex. | 4.8600 | 4.8590 | 4.8580 | .... | 4.8580 | 4.8555 |

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

*Silver*—Current quotations for silver are practically in the hands of a group of East India speculators in London and India, who are operating for a rise, basing the chances of an advance later in the season on economic and financial conditions in India. Silver in London and in Indian centers is now in abundant supply, but under control of those who are looking for a betterment in the price later on.

### Copper, Tin, Lead and Zinc

| June-July. | Copper. Lake, Cts. per lb. | Copper. Electrolytic, Cts. per lb. | Copper. London, £ per ton. | Tin. Cts. per lb. | Lead. New York, Cts. per lb. | Lead. St. Louis, Cts. per lb. | Zinc. St. Louis, Cts. per lb. |
|---|---|---|---|---|---|---|---|
| 30 | 12⅝@12¾ | 12¼@12¾ | 54½ | 33⅜ | 4.35@4.40 | 4.22½@4.27½ | 5.00@5.05 |
| 1 | 12⅝@12¾ | 12⅛@12⅝ | 54¾ | 32⅞ | 4.35@4.40 | 4.25@4.27½ | 5.02½@5.07½ |
| 2 | 12⅝@12¾ | 12⅛@12⅝ | ... | 32⅞ | 4.35@4.40 | 4.25@4.27½ | 5.02½@5.07½ |
| 4 | ..... | ..... | .... | .... | ..... | ..... | ..... |
| 5 | 12⅝@12¾ | 12⅛@12⅝ | 54 13/16 | 32⅞ | 4.35@4.40 | 4.25@4.27½ | 5.00@5.05 |
| 6 | 12⅝@12¾ | 12¼@12⅝ | 54⅞ | 32⅞ | 4.35@4.40 | 4.25@4.27½ | 5.00@5.05 |

London quotations are per long ton (2240 lb.) standard copper. The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

*Copper*—The market is quiet and without special feature. Manufacturers are busy with stock-taking and having covered their immediate wants a short time ago, have kept out of the market. Not much business has been transacted and the market closes unchanged at 12⅝@12¾c. for Lake copper, and 12⅛@12⅜c. for electrolytic copper in cakes, wirebars and ingots. Casting copper is quoted nominally at 12@12⅛ cents.

Copper sheets are 18@19c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 14c. base, carload lots at mill.

The London market for standard copper has fluctuated within narrow limits, and closes at £54 17s. 6d. for spot, and £55 for three months.

Refined and manufactured sorts we quote: English tough, £58; best selected, £59@£59 10s.; strong sheets, £67@£68 per ton.

Exports of copper from New York for the week were 5.845 long tons. Our special correspondent gives the exports from Baltimore at 2042 tons.

*Copper in June*—The history of the copper market in June was a slow decline from the level of 12⅝c. to 12¼c., followed by a little rally and then again recession to 12¼c. A good volume of business was done both for domestic and foreign accounts, and as the leading interest remained out of the market, the other agencies succeeded in disposing of their product well ahead. However, the buying, especially that by domestic manufacturers, was chiefly of hand-to-mouth character. Their strong demand for copper for early shipment indicated that they have allowed their stocks to run down to a low point. With the large existing surplus of copper they have undoubtedly pursued, so far, a safe policy in relying upon hand-to-mouth purchases, but at the end of June it looked as if they might soon have to come to the terms for which the leading seller is holding, inasmuch as this interest now controls the major part of the visible supply in this country.

*Tin*—The favorable statistics for last month, which not only showed much larger deliveries for consumption in the United States than was anticipated, but also a falling off in shipments from the Straits, gave the London market a very strong undertone in the middle of last week. As, however, orders from this side failed to materialize, the London market quickly lost the larger part of its advance, and closes barely steady at £149 17s. 6d. for spot, and £150 15s. for futures.

Very little business is being done in the domestic market, where consumers are only buying what they actually need. At the close, spot tin is quoted at 32⅞ cents.

Imports of tin into the United States in May are reported at 4,878,357 lb.; a decrease of 4,075,180 lb. as compared with May, last year.

Visible stocks of tin on July 1 are reported as follows—including 6241 tons afloat: London, 10,086; Holland, 2020; United States, excluding Pacific ports, 3594; total, 15,700 long tons, a decrease of 3298 tons, as compared with the June 1 report.

*Lead*—The market is slightly firmer, St. Louis being quoted at 4.25@4.27½, and New York at 4.35@4.40 cents.

The London market for Spanish lead is somewhat lower at £12 11s. 3d. and £12 13s. 9d. for English lead.

*Spelter*—The market continues quiet, and inquiry is small. Early in the week the market was somewhat firmer, but at the close it has again eased off and is quoted at 5@5.05c., St. Louis, and 5.15@5.20c., New York.

New York quotations for spelter, June 30, were 5.15@5.20c.; July 1 and 2, 5.17½@5.22½c.; July 5 and 6, 5.15@5.20 cents.

The London market for good ordinaries is 10s. lower, being £22 5s., while £22 10s. is quoted for specials.

Base price of zinc sheets is $7.50 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

## Other Metals

*Aluminum*—The market is rather quiet, as is to be expected at this season, but prices are unchanged. We quote No. 1 ingots at 23¼c. per lb., New York delivery. The foreign market is reported in fair condition.

*Antimony*—The market still remains quiet. Cookson's is quoted at 8.15@8.20c. per lb. Other prices are 7⅞@8c. for U. S.; 7⅜@7½c. for outside brands.

*Quicksilver*—Business is on a good scale, but there is no change in prices. New York quotations are $47 per flask of 75 lb. for large orders; $48@49 for jobbing lots. San Francisco, $46@46.50 for domestic orders and $2 less for export. The London price is £8 15s. per flask, with £8 12s. 6d. quoted by jobbers.

*Nickel*—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 500-lb. lots, up to 55c. for 200-lb. lots. The price for electrolytic is 5c. higher.

*Magnesium*—The price of pure metal is $1.50 per lb. for 100-lb. lots, f.o.b. New York.

*Cadmium*—Current quotations are 65@70c. per lb. in 100-lb. lots at Cleveland, Ohio.

## Imports and Exports of Metals

Exports and imports of metals in the United States, five months ended May 31, are reported as follows, in the measures usual in the trade:

| Metals: | Exports. | Imports. | Excess. |
|---|---|---|---|
| Copper, long tons | 107,024 | 63,804 | Exp. 43,220 |
| Copper, 1909.... | 119,227 | 60,305 | Exp. 58,922 |
| Tin, long tons.... | 188 | 20,270 | Imp. 20,082 |
| Tin, 1909..... | 150 | 18,329 | Imp. 18,179 |
| Lead, short tons. | 32,415 | 44,723 | Imp. 12,308 |
| Lead, 1909..... | 37,234 | 47,766 | Imp. 10,532 |
| Spelter, sh. tons. | 512 | 1,263 | Imp. 751 |
| Spelter, 1909.... | 2,127 | 1,252 | Exp. 875 |
| Nickel, lb..... | 6,270,262 | 13,903,309 | Imp. 7,633,047 |
| Nickel, 1909.... | 4,838,123 | 8,633,910 | Imp. 3,795,787 |
| Antimony, lb..... | ..... | 4,096,041 | Imp. 4,096,041 |
| Antimony, 1909. | 8,648 | 4,579,759 | Imp. 4,571,111 |
| Platinum, oz..... | ... .... | 43,241 | Imp. 43,241 |
| Platinum, 1909. ..... . | | 46,405 | Imp. 46,405 |
| Quicksilver, lb... | 106,292 | ..... | Exp. 106,292 |
| Quicksilver, '09 | 149,950 | ..... | Exp. 149,950 |
| Aluminum, value | $183,747 | ..... | Exp. $183,747 |
| Aluminum, 1909 | 138,342 | ..... | Exp. 138,342 |
| Ores, etc.: | | | |
| Zinc oxide, lb. . .11,390,114 | | ..... | Exp.11,390,114 |
| Zinc oxide, '09..12,282,000 | | ..... | Exp.12,282,000 |
| Zinc dross, lb.... | 5,231,711 | ..... | Exp. 5,231,711 |
| Zinc dross, '09.. | 9,148,447 | ..... | Exp. 9,148,447 |
| Zinc ores, lg.tons | 9,434 | 29,553 | Imp. 20,119 |
| Zinc ores, 1909. | 6,460 | 45,274 | Imp. 38,814 |
| Antim'y ores, lb. | ..... | ..... | ..... |
| Ant. ores, 1909. | 504 | 3,295,757 | Imp. 3,295,253 |
| Chrome ore, tons | 30 | 18,868 | Imp. 18,838 |
| Chrome ore, '09 | ..... | 17,741 | Imp. 17,741 |

Copper, lead and nickel (and antimony from Aug. 5, 1909) include the metal contents of ores, matte, bullion, etc. The exports given include reëxports of foreign material. Zinc contents of ore imported in 1910 were 22,409,373 lb.; not reported prior to date of new tariff. Quantity of antimony ore is not reported this year, only metal contents being given. Imports of aluminum are not reported. Exports of copper sulphate this year were equivalent to 780,530 lb. copper.

## Zinc and Lead Ore Markets

*Platteville, Wis., July 2*—The base price paid this week for 60 per cent. zinc ore was $40 per ton; no premium ore was sold. The highest price paid for lead ore was $51 per ton; the base price of 80 per cent. lead was $49@50 per ton.

SHIPMENTS, WEEK ENDED JULY 2.

| Camps. | Zinc ore, lb. | Lead ore, lb. | Sulphur ore, lb. |
|---|---|---|---|
| Platteville..... | 359,100 | ..... | 415,500 |
| Highland..... | 248,800 | ..... | ..... |
| Cuba City..... | 251,610 | 152,170 | 183,180 |
| Galena..... | 234,000 | ..... | ..... |
| Linden..... | 194,570 | ..... | 64,510 |
| Shullsburg..... | 142,000 | ..... | ..... |
| Benton..... | ..... | 81,320 | ..... |
| Hazel Green..... | ..... | 58,400 | ..... |
| Total..... | 1,430,080 | 291,890 | 663,190 |
| Year to date..... | 41,851,676 | 3,602,829 | 10,357,995 |

In addition to the above there was shipped during the week to the separating plants, 2,642,110 lb. zinc concentrates.

*Joplin, Mo., July 2*—The highest price paid for zinc sulphide ore was $44 per ton, the base $39@41 per ton of 60 per cent. zinc. Zinc silicate sold at $22@24 per ton of 40 per cent. zinc. The average price, all grades of zinc, was $36.64 per ton. Lead ore continues unchanged at $49 per ton for 80 per cent. or better, with the usual deductions for ores under 80 per cent. test. The average price all grades of lead, was $48.76 per ton.

Only two previous weeks this year exceeded this week in the shipment of zinc ore, which was an increase of 850 tons over last week. The shipment of the year is still 4000 tons behind last year.

SHIPMENTS, WEEK ENDED JULY 2.

| | Zinc, lb. | Lead lb. | Value. |
|---|---|---|---|
| Webb City-Carterville | 5,220,790 | 1,111,200 | $126,417 |
| Joplin | 1,907,030 | 296,870 | 45,325 |
| Alba-Neck | 1,310,860 | 34,020 | 28,999 |
| Duenweg | 523,620 | 163,140 | 13,406 |
| Granby | 811,860 | 134,430 | 11,995 |
| Galena | 497,810 | 84,140 | 11,711 |
| Miami | 686,920 | 58,080 | 8,263 |
| Badger | 394,130 | 1,380 | 8,114 |
| Oronogo | 237,110 | 54,400 | 6,103 |
| Spurgeon | 215,580 | 92,400 | 5,165 |
| Carl Junction | 206,110 | ..... | 4,328 |
| Cave Springs | 156,530 | 19,040 | 3,379 |
| Aurora | 227,420 | ..... | 3,010 |
| Carthage | 131,020 | ..... | 2,685 |
| Sarcoxie | 119,700 | ..... | 2,394 |
| Quapaw | 125,520 | ..... | 2,259 |
| Stott City | 70,740 | ..... | 1,415 |
| Totals | 12,839,750 | 2,049,100 | $284,968 |
| 27 weeks | 298,058,900 | 44,713,580 | $7,097,184 |

Zinc value, the week, $235,005; 27 weeks, $5,940,093
Lead value, the week, 49,963; 27 weeks, 1,157,091

MONTHLY AVERAGE PRICES.

| Month. | Zinc Ore. Base Price. | | Zinc Ore. All Ores. | | Lead Ore. All Ores. | |
|---|---|---|---|---|---|---|
| | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. |
| January | $41.25 | $47.31 | $38.46 | $45.16 | $52.17 | $56.99 |
| February | 36.94 | 40.69 | 34.37 | 39.47 | 50.50 | 53.64 |
| March | 37.40 | 43.60 | 34.71 | 39.71 | 50.82 | 51.26 |
| April | 38.63 | 41.00 | 37.01 | 39.33 | 55.63 | 49.72 |
| May | 40.06 | 40.19 | 37.42 | 37.51 | 56.59 | 48.16 |
| June | 44.15 | 40.20 | 40.35 | 37.83 | 57.52 | 48.80 |
| July | 43.06 | ..... | 41.11 | ..... | 53.74 | ..... |
| August | 48.25 | ..... | 44.54 | ..... | 57.60 | ..... |
| September | 47.70 | ..... | 44.87 | ..... | 56.11 | ..... |
| October | 49.50 | ..... | 45.75 | ..... | 55.02 | ..... |
| November | 51.31 | ..... | 48.29 | ..... | 53.94 | ..... |
| December | 49.45 | ..... | 47.57 | ..... | 55.26 | ..... |
| Year | $43.98 | ..... | $41.20 | ..... | $54.60 | ..... |

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

## Other Ore Markets

*Iron Ore*—Current quotations for Lake Superior ores, on dock at Lake Erie ports, are: Bessemer ore—base 55 per cent. iron and under 0.45 phosphorus—$5 per ton for Old Range and $4.75 for Mesabi; nonbessemer—base 51.5 per cent. iron—$4.20 for Old Range and $4 for Mesabi.

In the East there is no organization of sellers, and a wide range of prices exists, according to quality and location of mines. A good nonbessemer ore, around 50 or 55 per cent. iron, can be had at $3@3.50 per ton, f.o.b. mines; but no general quotations can be given.

*Manganese Ore*—The base price, as fixed by the large buyers, is 25c. per unit for manganese and 5c. per unit for iron content, for a base ore containing 40 per cent. or over in manganese, not over 0.20 phosphorus and 8 per cent. silica. Prices content, for a base ore containing 49 per cent. manganese; with deductions for excess of phosphorus and silica.

*Zinc Ore*—For Rocky Mountain blende, delivered at Kansas smelting points, the current price is for the zinc content, less eight units, at the St. Louis price for spelter, less $14@15 per 2000 lb. of ore, according to quality, especially as to iron and lead content. See also Joplin and Wisconsin ore markets.

*Pyrites*—Domestic furnace sizes fetch 11@11½c. per unit, delivered at eastern acid works; fines, 10¾@11c. Pyrites containing arsenic realize from ½@1½c. per unit less.

*Tungsten Ore*—Ferberite, wolframite and huebnerite ores, $6.50@7 per unit per ton of 2000 lb. for ore containing 60 per cent. of tungsten trioxide. For scheelite ores, 50c.@$1.50 per unit less.

## CHEMICALS

*New York, July* 6—Business in general is quiet.

*Copper Sulphate*—Business is fairly steady, and quotations are unchanged at $4 per 100 lb. for carload lots and $4.25 per 100 lb. for smaller parcels.

*Arsenic*—Trade in this article is still rather light, but prices are a shade better, $2.25@2.37½ per 100 lb. being quoted for white arsenic.

*Potash Salts*—A Washington despatch says that the State Department will send a commission of experts to Berlin to discuss with the German officials the questions which have arisen in relation to prices of potash salts in connection with the American contracts.

*Nitrate of Soda*—Only a light summer trade is forward. Quotations are 2.10c. per lb. for both spot and futures.

*Sulphur*—Messrs. Parsons & Petit, New York, report on June 30 the importation by them of 1000 tons best unmixed seconds brimstone from Sicily.

*Imports and Exports*—Imports and exports of chemicals and raw materials in the United States, five months ended May 31:

| | Imports. | Exports. | Excess. |
|---|---|---|---|
| Copper sulph. lb. | ..... | 3,122,121 E. | 3,122,121 |
| Copper sul., '09 | ..... | 1,954,388 E. | 1,954,388 |
| Bleach, lb. | 41,292,444 | ..... I. | 41,292,444 |
| Bleach, 1909 | 35,972,919 | 10,607 I. | 35,962,312 |
| Potash salts, lb. | 265,408,751 | 1,940,213 I. | 263,468,538 |
| Potash salts, '09 | 150,783,225 | 1,766,812 I. | 149,016,413 |
| Soda salts, lb. | 15,509,619 | 229,599 I. | 15,280,020 |
| Soda salts, 1909 | 5,873,928 | 273,506 I. | 5,600,422 |
| Acetate lime, lb. | ..... | 28,062,438 E. | 28,062,438 |
| Acetate, 1909 | ..... | 38,388,877 E. | 38,388,877 |
| Nit. of soda, tons | 253,169 | 2,702 I. | 250,467 |
| Nitrate, 1909 | 148,017 | 3,261 I. | 144,756 |
| Phosphates, tons | 2,349 | 429,051 E. | 419,702 |
| Phosphates, '09 | 5,577 | 448,344 E. | 442,767 |
| Sulphur, tons | 13,581 | 9,107 I. | 4,474 |
| Sulphur, 1909 | 12,724 | 9,038 I. | 3,686 |
| Pyrites, tons | 325,587 | ..... I. | 325,587 |
| Pyrites, 1909 | 280,662 | ..... I. | 280,662 |
| Magnesite, lb. | 106,171,280 | 1,813,294 I. | 104,357,986 |
| Magnesite, 1909 | ..... | ..... | ..... |

Exports include reëxports of foreign material. Figures for magnesite not reported prior to July 1, 1909. Estimating sulphur contents of pyrites, the total imports of sulphur in 1910 were 125,846 tons.

## MINING·STOCKS $

*New York, July* 6—The general stock markets through the week have been in a depressed condition, with prices falling in almost every direction. The trading has been largely of a professional sort and the public seems to be too busy buying land, building and otherwise using its money to put much of it into stocks. Lower levels have been reached in nearly all stocks.

The Curb also had a poor week, and the holiday was rather a welcome relief. The copper stocks generally found lower quotations on a moderately active business. There was no exception to the lower prices. Cobalt stocks were in less demand than recently. Goldfield Consolidated and the other Nevada stocks quieted down. The market closes generally weak and depressed.

COPPER PRODUCTION REPORTS.
Copper contents of blister copper, in pounds.

| Company. | March. | April. | May. |
|---|---|---|---|
| Arizona, Ltd. | 2,886,000 | 2,340,000 | 2,610,000 |
| Balaklala | 1,263 '33 | 1,109,311 | 1,148,762 |
| Boleo (Mexico) | 2,148,383 | 2,777,800 | 2,735,680 |
| Copper Queen | 10,809,488 | 9,920,000 | 10,283,855 |
| Calumet & Ariz. | 2,820,000 | 2,400,000 | 1,778,000 |
| Cananea (Mexico) | 3,700,000 | 4,262,000 | 4,300,000 |
| Detroit | 1,698,975 | 1,930,000 | 2,035,639 |
| Imperial | 825,000 | 800,000 | 700,000 |
| Nevada Con. (Est.) | 5,339,466 | 5,500,000 | 5,500,000 |
| Old Dominion | 2,674,000 | 2,325,000 | 2,174,000 |
| Shannon | 1,468,000 | 1,288,000 | 1,326,000 |
| Superior & Pitts. | 2,370,000 | 2,130,000 | 2,276,000 |
| Utah Copper Co. | 7,853,288 | 7,902,643 | 8,862,900 |
| Butte District | 24,000,000 | 25,000,000 | 24,850,000 |
| Lake Superior | 19,250,000 | 16,250,000 | 19,250,000 |
| Total production. | 89,366,867 | 86 934,754 | 89,830,836 |
| Imports, bars, etc. | 20,178,202 | 21,180,396 | 24,850,919 |
| Imp. in ore & matte | 6,181,476 | 12,527,371 | 6,487,243 |
| Total | 115,726,545 | 120,642,521 | 121,168,998 |

Butte district and Lake Superior figures are estimated; others are reports received from companies. Imports duplicate production of Cananea, and that part of Copper Queen production which comes from Nacozari. Boleo copper does not come to American refiners. Utah Copper report for March includes for the first time the output of the Boston mill.

STATISTICS OF COPPER.

| Month. | United States Product'n. | Deliveries, Domestic. | Deliveries for Export. |
|---|---|---|---|
| VII, 1909 | 118,277,603 | 75,520,083 | 75,018,974 |
| VIII | 120,597,234 | 59,614,207 | 48,382,704 |
| IX | 118,023,139 | 52,105,955 | 50,077,777 |
| X | 124,657,709 | 66,359,617 | 56,261,238 |
| XI | 121,618,369 | 66,857,873 | 55,266,595 |
| XII | 117,828,655 | 69,519,501 | 59,546,570 |
| Year | 1,405,403,056 | 705,051,591 | 680,942,620 |
| I, 1910 | 116,547,287 | 78,158,387 | 81,691,672 |
| II | 112,712,493 | 66,618,322 | 37,369,518 |
| III | 120,067,467 | 62,944,818 | 40,585,767 |
| IV | 117,477,639 | 67,985,951 | 31,332,434 |
| V | 123,242,476 | 59,305,222 | 45,495,400 |
| VI | ..... | ..... | ..... |

| | Visible Stocks. United States. | Europe. | Total. |
|---|---|---|---|
| VII, 1909 | 154,858,061 | 150,928,960 | 305,787,021 |
| VIII | 122,596,607 | 171,492,160 | 294,088,767 |
| IX | 135,196,930 | 197,993,600 | 333,190,530 |
| X | 151,472,772 | 210,224,000 | 361,696,772 |
| XI | 153,509,626 | 222,566,400 | 376,076,026 |
| XII | 153,003,527 | 236,857,600 | 389,861,127 |
| I, 1910 | 141,766,111 | 244,204,800 | 385,970,911 |
| II | 98,463,339 | 248,236,800 | 346,700,139 |
| III | 107,187,992 | 254,150,400 | 361,338,392 |
| IV | 123,824,874 | 249,625,600 | 373,450,474 |
| V | 141,984,159 | 246,870,400 | 388,854,559 |
| VI | 160,425,973 | 239,142,400 | 399,568,373 |
| VII | ..... | 232,892,800 | ..... |

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

*Boston, July* 5—The copper share market continues to be influenced by the fluctuations and persistent weakness of the New York list.

Copper shares are at about the low of the year, and represent a shrinkage of over $334,000,000 from the high prices prevailing in 1909, taking 38 of the leading stocks. The Osceola's reduction in its semi-annual rate from $6 to $4 was expected and although it caused a few dollars to be shaded from the price of the shares, it had no particular effect on the balance of the list. Calumet & Hecla at $519 per share is the lowest in a long period.

The Curb market has been dull and uninteresting. A lower level of prices is to be recorded there, with South Lake, First National and Davis-Daly at about the lowest.

**Assessments**

| Company. | Delinq. | Sale. | Amt. |
|---|---|---|---|
| Alta, Nev. | July 4 | July 29 | $0.03 |
| Amador, Ida. | Feb. 24 | June 30 | 0.01 |
| Belcher, Nev. | July 4 | July 29 | 0.10 |
| Caledonia, Nev. | June 17 | July 8 | 0.10 |
| Central Eureka, Nev. | June 12 | July 16 | 0.02½ |
| Chollar, Nev. | July 3 | July 29 | 0.10 |
| Copper King, Ida. | July 30 | ..... | 0.01 |
| Crown Point, Nev. | June 26 | July 20 | 0.10 |
| Davis-Daly, Mont. | July | ..... | 0.50 |
| Davis-Daly, Mont. | Sept. | ..... | 0.50 |
| Gould & Curry, Nev. | July 17 | Aug. 10 | 0.10 |
| Hancock Con., Mich. | Au.Oct. | ..... | 3.00 |
| Justice, Nev. | June 25 | July 19 | 0.03 |
| La Palma, Cal. | June 10 | July 25 | 0.10 |
| May Day, Utah | July 15 | ..... | 0.02 |
| Ophir, Nev. | July 4 | Aug. 2 | 0.25 |
| Reindeer, Ida. | May 31 | Aug. 1 | 0.00½ |
| Rhode Island Copper, Mich. | ..... | ..... | 0.50 |
| Scottish Chief, Utah | ..... | ..... | 0.01 |
| Silver Hill, Nev. | July 27 | Aug. 22 | 0.05 |
| Texan, Utah | July 2 | July 23 | 0.01 |
| Yankee Cons., Utah | June 24 | July 14 | 0.02 |

**Monthly Average Prices of Metals**

SILVER

| Month. | New York. | | London. | |
|---|---|---|---|---|
| | 1909. | 1910. | 1909. | 1910. |
| January | 51.750 | 52.375 | 23.843 | 24.154 |
| February | 51.472 | 51.534 | 23.706 | 23.794 |
| March | 50.468 | 51.454 | 23.227 | 23.690 |
| April | 51.428 | 53.221 | 23.708 | 24.483 |
| May | 52.905 | 53.870 | 24.343 | 24.797 |
| June | 52.538 | 53.462 | 24.166 | 24.651 |
| July | 51.043 | ..... | 23.519 | ..... |
| August | 51.125 | ..... | 23.588 | ..... |
| September | 51.440 | ..... | 23.743 | ..... |
| October | 50 923 | ..... | 23.502 | ..... |
| November | 50.703 | ..... | 23.351 | ..... |
| December | 52.226 | ..... | 24.030 | ..... |
| Total | 51.502 | ..... | 23.706 | ..... |

New York, cents per fine ounce; London, pence per standard ounce.

COPPER.

| | New York. | | | | London. | |
|---|---|---|---|---|---|---|
| | Electrolytic | | Lake. | | | |
| | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. |
| January | 13.893 | 13.620 | 14.280 | 13.870 | 61.198 | 60.923 |
| February | 12.949 | 13.332 | 13.295 | 13.719 | 57.688 | 59.388 |
| March | 12.387 | 13.255 | 12.826 | 13.586 | 56.231 | 59.214 |
| April | 12.56½ | 12.733 | 12.93⅜ | 13.091 | 57.363 | 57.238 |
| May | 12.893 | 12.550 | 13.238 | 12.885 | 59.338 | 56.313 |
| June | 13.214 | 12.404 | 13.548 | 12.798 | 59.627 | 55.310 |
| July | 12.880 | ..... | 13.363 | ..... | 58.556 | ..... |
| August | 13.007 | ..... | 13.296 | ..... | 59.393 | ..... |
| September | 12.870 | ..... | 13.210 | ..... | 59.021 | ..... |
| October | 12.700 | ..... | 13.030 | ..... | 57.551 | ..... |
| November | 13.125 | ..... | 13.354 | ..... | 58.917 | ..... |
| December | 13.298 | ..... | 13.647 | ..... | 59.906 | ..... |
| Year | 12.982 | ..... | 13.335 | ..... | 58.732 | ..... |

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

| Month. | 1909. | 1910. | Month. | 1909. | 1910. |
|---|---|---|---|---|---|
| January | 28.060 | 32.700 | July | 29.125 | ..... |
| February | 28.290 | 32.920 | August | 29.956 | ..... |
| March | 28.727 | 32.463 | September | 30.293 | ..... |
| April | 29.445 | 32.976 | October | 30.475 | ..... |
| May | 29.225 | 33.125 | November | 30.859 | ..... |
| June | 29.322 | 32.769 | December | 32.913 | ..... |
| | | | Av. Year | 29.725 | ..... |

Prices are in cents per pound.

LEAD

| Month. | New York. | | St. Louis. | | London. | |
|---|---|---|---|---|---|---|
| | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. |
| January | 4.175 | 4.700 | 4.025 | 4.582 | 13.113 | 13.650 |
| February | 4.018 | 4.613 | 3.868 | 4.445 | 13.313 | 13.328 |
| March | 3.986 | 4.459 | 3.835 | 4.307 | 13.438 | 13.063 |
| April | 4.168 | 4.376 | 4.051 | 4.225 | 13.297 | 12.641 |
| May | 4.287 | 4 315 | 4.214 | 4.164 | 13.225 | 12.550 |
| June | 4.350 | 4.343 | 4.291 | 4.207 | 13.031 | 12.688 |
| July | 4.321 | ..... | 4.188 | ..... | 12.563 | ..... |
| August | 4.363 | ..... | 4.227 | ..... | 12.475 | ..... |
| September | 4.342 | ..... | 4.215 | ..... | 12.781 | ..... |
| October | 4.341 | ..... | 4.215 | ..... | 13.175 | ..... |
| November | 4.370 | ..... | 4.252 | ..... | 13.047 | ..... |
| December | 4.560 | ..... | 4.459 | ..... | 13.125 | ..... |
| Year | 4.273 | ..... | 4.153 | ..... | 13.049 | ..... |

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

| | New York. | | St. Louis. | | London. | |
|---|---|---|---|---|---|---|
| | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. |
| January | 5.141 | 6.101 | 4.991 | 5.951 | 21.425 | 23.350 |
| February | 4.889 | 5.569 | 4.739 | 5.419 | 21.562 | 23.188 |
| March | 4.757 | 5.637 | 4.607 | 5.487 | 21.438 | 23.031 |
| April | 4.965 | 5.439 | 4.815 | 5.289 | 21.531 | 22.469 |
| May | 5.124 | 5.191 | 4.974 | 5.041 | 21.975 | 22.100 |
| June | 5.402 | 5.128 | 5.252 | 4.978 | 22.000 | 22.219 |
| July | 5.402 | ..... | 5.252 | ..... | 21.969 | ..... |
| August | 5.729 | ..... | 5.579 | ..... | 22.125 | ..... |
| September | 5.796 | ..... | 5.646 | ..... | 22.906 | ..... |
| October | 6.199 | ..... | 6.043 | ..... | 23.200 | ..... |
| November | 6.381 | ..... | 6.231 | ..... | 23.188 | ..... |
| December | 6.249 | ..... | 6.099 | ..... | 23.094 | ..... |
| Year | 5.503 | ..... | 5.352 | ..... | 22.201 | ..... |

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PRICES OF PIG IRON AT PITTSBURG.

| | Bessemer. | | Basic. | | No. 2 Foundry. | |
|---|---|---|---|---|---|---|
| | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. |
| January | $17.18 | $19.90 | $16.40 | $17.98 | $16.26 | $17.94 |
| February | 16.73 | 18.96 | 16.09 | 17.21 | 15.90 | 17.38 |
| March | 16.40 | 18.53 | 15.84 | 16.93 | 15.62 | 17.00 |
| April | 15.79 | 18.28 | 15.05 | 16.84 | 15.06 | 16.75 |
| May | 15.77 | 17.10 | 15.02 | 15.94 | 15.08 | 16.18 |
| June | 16.13 | 16.52 | 15.84 | 15.60 | 15.63 | 15.53 |
| July | 16.40 | ..... | 15.90 | ..... | 15.96 | ..... |
| August | 17.16 | ..... | 16.17 | ..... | 16.20 | ..... |
| September | 18.44 | ..... | 16.80 | ..... | 17.03 | ..... |
| October | 19.75 | ..... | 17.84 | ..... | 18.02 | ..... |
| November | 19.90 | ..... | 18.37 | ..... | 18.09 | ..... |
| December | 19.90 | ..... | 18.15 | ..... | 17.90 | ..... |
| Year | $17.46 | ..... | $16.46 | ..... | $16.40 | ..... |

# STOCK QUOTATIONS

COLO. SPRINGS July 5

| Name of Comp. | Bid. |
|---|---|
| Listed: | |
| Acacia | .05⅞ |
| Cripple Cr'k Con. | .02⅛ |
| C. K. & N. | .18½ |
| Doctor Jack Pot | .10 |
| Elkton Con. | ‡.80 |
| El Paso | .83⅞ |
| Fannie Rawlins | ‡.05 |
| Findlay | .08⅜ |
| Gold Dollar | ‡.15 |
| Gold Sovereign | ‡.03⅜ |
| Isabella | .18⅜ |
| Mary McKinney | .58 |
| Pharmacist | .03 |
| Portland | 1.15 |
| Vindicator | .92 |
| Work | .03½ |
| Unlisted: | |
| Golden Cycle | 1.00 |
| United Gold Mines | ‡ 08½ |

SALT LAKE July 5

| Name of Comp. | Clg. |
|---|---|
| Carisa | .45 |
| Colorado Mining | .39½ |
| Columbus Con. | .49 |
| Daly Judge | 3.95 |
| Grand Central | 1.25 |
| Iron Blossom | .78 |
| Little Bell | 1.10 |
| Little Chief | .22 |
| Lower Mammoth | .26 |
| Mason Valley | .... |
| Maj. Mines | ‡.58 |
| May Day | ‡.01⅜ |
| Nevada Hills | 1.72½ |
| New York | ‡.13 |
| Prince Con | .72 |
| Red Warrior | ‡6.00 |
| Silver King Coal'n | 2.10 |
| Sioux Con. | .24½ |
| Uncle Sam | .25 |
| Victoria | ‡1.07½ |

SAN FRANCISCO. July 5.

| Name of Comp. | Clg. |
|---|---|
| COMSTOCK STOCKS | |
| Atlanta | .10 |
| Belcher | .70 |
| Best & Belcher | .40 |
| Caledonia | .53 |
| Challenge Con | ‡.17 |
| Chollar | .10 |
| Confidence | .65 |
| Con. Cal. & Va. | .82 |
| Crown Point | .65 |
| Exchequer | .20 |
| Gould & Curry | .15 |
| Hale & Norcross | .20 |
| Mexican | 1.07 |
| Ophir | .86 |
| Overman | .91 |
| Potosi | ‡.40 |
| Savage | .18 |
| Sierra Nevada | .27 |
| Union | .36 |
| Yellow Jacket | .64 |

| Name of Comp. | Clg. |
|---|---|
| MISC. NEVADA | |
| Belmont | 3.50 |
| Daisy | .05 |
| Jim Butler | .27 |
| MacNamara | .31 |
| Midway | .24 |
| North Star | .06 |
| West End Con | .54 |
| Atlanta | .10 |
| Booth | .12 |
| C.O.D. Con | .07 |
| Columbia Mt. | .06 |
| Comb. Frac. | .49 |
| Great Bend | .02 |
| Jumbo Extension | .25 |
| Oro | .08 |
| Red Hill | .01 |
| Sandstorm | .02 |
| Silver Pick | .08 |
| St. Ives | .12 |
| Tramps Con. | .04 |

N. Y. EXCH. July 5

| Name of Comp. | Clg. |
|---|---|
| Amalgamated | 58⅛ |
| Am. Agri. Chem. | 38 |
| Am.Sm.&Ref.,com | 67½ |
| Am. Sm. & Ref., pf. | 100⅞ |
| Anaconda | 37 |
| Bethlehem Steel | ‡27⅞ |
| Col. & Hock. C. & I. | 15⅛ |
| Colo. Fuel & Iron | 32 |
| Du Pont P'd'r, pf. | ‡87½ |
| Federal M. & S. | 41 |
| Great Nor., ore ctf. | 49½ |
| Nat'nalLead,com. | 68⅞ |
| National Lead, pf. | 104⅜ |
| Nev. Consol. | 17¾ |
| Pittsburg Coal | 18¾ |
| Republic I&S,com. | 29¼ |
| Republic I & S, pf. | 91 |
| SlossSheff'd,com. | 64 |
| Sloss Sheffield, pf. | 114 |
| Tennessee Copper | ‡23 |
| Utah Copper | 40½ |
| U. S. Steel, com. | 69⅜ |
| U. S. Steel, pf. | 114 |
| Va. Car. Chem. | 55⅛ |

N. Y. CURB July 5

| Name of Comp. | Clg. |
|---|---|
| Bonanza Creek | 3 |
| Boston Copper | 18 |
| Braden Copper | 3¾ |
| B. C. Copper | 5 |
| Buffalo Mines | ‡2½ |
| Butte Coalition | 16⅛ |
| Caledonia | ⅞ |
| Chino | 10½ |
| Cobalt Central | .08 |
| Cobalt Prov. | 59 |
| Con. Ariz. Sm. | 1⅞ |
| Cumberland Ely. | 9 |
| Davis-Daly | 1⅛ |
| Dominion Cop. | ‡7 |
| Ely Con | .50 |
| El Rayo | 4 |
| Florence | 2.22 |
| Gila Copper | 5 |
| Giroux | 6⅝ |
| Gold Hill | ⅛ |
| Goldfield Con. | 8¾ |
| Greene Cananea | 6⅝ |
| Guanajuato | ‡1⅝ |
| Guggen. Exp. | 185 |
| Kerr Lake | .08 |
| La Rose | 4 |
| McKinley-Dar-Sa. | .90 |
| Miami Copper | 18¾ |
| Mines Co. of Am. | 64 |
| Mont. Shoshone | ⅞ |
| Mont.-Tonopah | ‡.70 |
| Nev. Utah M. & S. | ⅝ |
| New Baltic | ‡7 |
| Newhouse M. & S. | 3½ |
| Nipissing Mines | 10¾ |
| Ohio Copper | 1⅛ |
| Pacific Sm. & M. | ⅞ |
| Ray Central | 2¼ |
| Ray Con | 16 |
| Silver Queen | ‡.35 |
| Standard Oil | 610 |
| Stewart | ⅛ |
| Tonopah | 8¾ |
| Tonopah Ex. | ‡.90 |
| Tri-Bullion | ⅛ |
| W. Va. Wyo. Cop. | ‡2⅛ |
| Yukon Gold | 4 |

LONDON July 6

| Name of Com. | Clg. |
|---|---|
| Dolores | £1 10s 0d |
| Stratton'sInd. | 0 3 3 |
| Camp Bird | 1 6 6 |
| Esperanza | 2 16 3 |
| Tomboy | 0 17 6 |
| El Oro | 1 7 0 |
| Oroville | 0 6 6 |
| Mexico Mines | 9 13 9 |

BOSTON EXCH. July 5

| Name of Comp. | Clg. |
|---|---|
| Adventure | 5 |
| Allouez | 36 |
| Am. Zinc | 21⅛ |
| Arcadian | 4 |
| Arizona Com | 13½ |
| Atlantic | 5¼ |
| Boston Con. | 15 |
| Butte & Balak | 12¾ |
| Calumet & Ariz. | 50 |
| Calumet & Hecla | 519 |
| Centennial | 14⅛ |
| Con. Mercur | ‡.08 |
| Copper Range | 58½ |
| Daly-West | 8 |
| East Butte | 7 |
| Franklin | 9¾ |
| Granby | 30 |
| Hancock | 16¼ |
| Helvetia | 2⅛ |
| Indiana | 12 |
| Isle Royale | 14⅛ |
| Keweenaw | 3 |
| Lake | 43¼ |
| La Salle | 10 |
| Mass. | 7 |
| Michigan | 4 |
| Mohawk | 45 |
| Nevada | 18⅛ |
| North Butte | 20⅜ |
| North Lake | 9 |
| Ojibway | 6¼ |
| Old Dominion | 32 |
| Osceola | 120 |
| Parrot | 12 |
| Quincy | 16½ |
| Shannon | 8¾ |
| Superior | 38½ |
| Superior & Bost. | 8¾ |
| Superior & Pitts. | 9½ |
| Tamarack | 48 |
| Trinity | 5 |
| U. S. Smg. & Ref. | 36¾ |
| U.S.Sm. & Re., pd. | 47 |
| Utah Apex | 3 |
| Utah Con. | 19¼ |
| Victoria | 2⅝ |
| Winona | 6 |
| Wolverine | 108 |
| Wyandotte | 1½ |

BOSTON CURB July 5

| Name of Comp. | Clg. |
|---|---|
| Ahmeek | ‡170 |
| Bingham Mines | 3 |
| Boston Ely | 1¾ |
| Boswyocolo | ‡.07 |
| Cactus | 2 |
| Calaveras | 8¾ |
| Champion | .05 |
| Chemung | ‡8½ |
| Chief Cons | 1⅝ |
| Cons. Ariz. | 1⅛ |
| Corbin | .05¾ |
| Crown Reserve | 2¾ |
| First Nat. Cop. | 3½ |
| Inspiration | 7⅛ |
| Mackinaw | ‡.06 |
| Majestic | .53 |
| Nat'l Mine | .22 |
| Nevada-Douglas | 2⅞ |
| Oneco | 2¾ |
| Raven Copper | .26 |
| Rhode Island Coal | 5¾ |
| San Antonio | 6½ |
| Shattuck-Ariz | 23½ |
| South Lake | 5¼ |
| Superior & Globe | .30 |
| Trethewey | 1⅞ |
| Tuolumne Copper | 2¾ |
| Vulture | 9 |
| Yuma | .40 |

‡Last quotation.

## Mining and Metallurgical Companies—U. S.

| Name of Company and Situation. | | Shares. Issued. | Par Val. | Dividends. Total to Date. | Latest. Date. | Amt. |
|---|---|---|---|---|---|---|
| Alaska Mexican, g. | Alas | 180,000 | $ 5 | $ 2,634,381 | May '10 | $0.30 |
| Alaska Treadwell, g. | Alas | 200,000 | 25 | 11,335,000 | May '10 | 0.50 |
| Alaska United, g. | Alas | 180,200 | 5 | 721,110 | May '10 | 0.20 |
| Amalgamated, c. | Mont | 1,538,879 | 100 | 61,271,006 | May '10 | 0.50 |
| Am. Sm.&Ref.,com. | U. S | 500,000 | 100 | 18,000,000 | July '10 | 1.00 |
| Am. Sm. & Ref.,pf. | U. S | 500,000 | 100 | 35,000,000 | July '10 | 1.75 |
| Am. Smelters, pf. A | U. S | 170,000 | 100 | 4,730,000 | June '10 | 1.50 |
| Am. Smelters, pf. B | U. S | 300,000 | 100 | 7,107,000 | June '10 | 1.25 |
| Am. Zinc,Lead&Sm. | Kan | 80,120 | 25 | 360,120 | July '10 | 0.50 |
| Anaconda, c. | Mont | 1,200,000 | 25 | 46,500,000 | Apr. '10 | 0.50 |
| Argonaut, g. | Cal | 200,000 | 5 | 1,130,000 | Nov. '09 | 0.20 |
| Arizona Copper, pf. | Ariz | 1,266,120 | 1.20 | 1,290,418 | Apr. '10 | 0.047 |
| Arizona Copper,com. | Ariz | 1,519,896 | 1.20 | 11,743,197 | Feb. '10 | 0.30 |
| Atlantic, c. | Mich | 100,000 | 25 | 990,000 | Feb. '05 | 0.02 |
| Bald Butte, g. s. | Mont | 250,000 | 1 | 1,354,648 | Oct. '07 | 0.04 |
| Beck Tunnel, g. s. l. | Utah | 1,000,000 | 0.10 | 675,000 | Oct. '07 | 0.02 |
| Boston & Montana. | Mont | 150,000 | 25 | 70,025,000 | Apr. '10 | 3.00 |
| Bull. Beck.&Cham.,g | Utah | 100,000 | 10 | 2,728,400 | July '08 | 0.10 |
| Bunker Hill& Sull. | Ida | 327,000 | 10 | 11,835,300 | July '10 | 0.30 |
| Butte Coalition, c.s. | Mont | 1,000,000 | 15 | 3,200,000 | June '10 | 0.25 |
| Calumet&Arizona, c. | Ariz | 200,000 | 10 | 11,300,000 | June '10 | 1.00 |
| Calumet & Hecla, c. | Mich | 100,000 | 25 | 112,050,000 | June '10 | 7.00 |
| Camp Bird, g s. | Colo | 820,000 | 5 | 5,766,650 | Oct. '09 | 0.24 |
| Colorado, l. s. | Utah | 1,000,000 | 0.20 | 2,210,000 | June '10 | 0.08 |
| Columbus Con., c. | Utah | 285,540 | 5 | 226,832 | Oct. '07 | 0.20 |
| Con. Mercur., g. | Utah | 1,000,000 | 1 | 3,385,313 | Dec. '06 | 0.02½ |
| Continental, z. l. | Mo | 22,000 | 25 | 231,000 | Oct. '08 | 0.25 |
| Copper Range Con. | Mich | 384,185 | 100 | 9,389,406 | July '10 | 1.00 |
| Creede United, g. | Colo | 1,625,000 | 1 | 214,053 | July '06 | 0.00½ |
| Daly Judge, g. s. l. | Utah | 300,000 | 1 | 225,000 | Apr '07 | 0.37½ |
| Daly West, g. s. l. | Utah | 180,000 | 20 | 6,147,000 | Apr. '10 | 0.30 |
| De Lamar, g. s. | Ida | 80,000 | 5 | 835,200 | Sept. '06 | 0.24 |
| Doe Run, l. | Mo | 65,749 | 100 | 2,349,751 | June '10 | 1.50 |
| Elkton Con., g. | Colo | 2,500,000 | 1 | 2,554,460 | June '10 | 0.01½ |
| El Paso, g. | Colo | 2,450,000 | 1 | 1,389,045 | Mar. '10 | 0.01 |
| Fed. M. & Sm., com. | Idaho | 60,000 | 100 | 2,708,750 | Jan. '09 | 1.50 |
| Federal M & S., pf. | Idaho | 120,000 | 100 | 5,741,250 | June '10 | 1.75 |
| Findley, g. | Colo | 250,000 | 1 | 337,500 | Sept. '06 | 0.01 |
| Florence, g. | Nev | 1,050,000 | 1 | 735,000 | Apr. '10 | 0.10 |
| Frances-Mohawk, g. | Nev | 912,000 | 1 | 546,000 | Jan. '08 | 0.05 |
| Gemini-Keystone. | Utah | 5,000 | 100 | 2,000,000 | Aug. '07 | 10.00 |
| Gen. Dev. Co. | U. S | 260,000 | 100 | 2,639,000 | Mar. '10 | 1.00 |
| Goldfield Con., g. | Nev | 3,558,367 | 10 | 9,247,652 | July '10 | 0.50 |
| Grand Central,g. | Utah | 250,000 | 1 | 1,331,250 | Dec. '09 | 0.04 |
| Granite g. | Colo | 1,650,000 | 1 | 247,000 | Dec. '09 | 0.01 |
| Guggenheim Expl. | U. S | 207,933 | 100 | 10,010,492 | July '10 | 2.50 |
| Hecla, s. l. | Idaho | 1,000,000 | 0.25 | 1,960,000 | Apr. '10 | 0.01 |
| Homestake, g. | S. D | 218,400 | 100 | 25,573,640 | June '10 | 0.50 |
| Horn Silver, g.s.c.z.l. | Utah | 400,000 | 25 | 5,642,000 | Sept. '07 | 0.05 |
| Imperial, c. | Ariz | 500,000 | 10 | 300,000 | June '07 | 0.20 |
| Inter'l Nickel, pf. | N. Y | 89,126 | 100 | 4,891,945 | Aug. '10 | 1.50 |
| Inter'l Sm. & Ref. | Utah | 100,000 | 100 | 750,000 | June '10 | 2.50 |
| Iron Blossom, s.l. | Utah | 1,000,000 | 100 | 620,000 | June '10 | 0.06 |
| Iron Silver, s. l. | Colo | 500,000 | 20 | 4,250,000 | Apr. '10 | 0.10 |
| Jamison, g. | Cal | 390,000 | 10 | 370,500 | Jan. '10 | 0.02 |
| Jerry Johnson, g. | Colo | 2,500,000 | 0.10 | 100,000 | Dec. '09 | 0.01 |
| Kendall, g. | Mont | 500,000 | 5 | 1,275,000 | Oct. '08 | 0.02 |
| Liberty Bell, g. s. | Colo | 130,551 | 5 | 228,353 | June '09 | 0.15 |
| MacNamara, s. g. | Nev | 728,341 | 1 | 40,213 | May '10 | 0.02½ |
| Mammoth, g. s. l. | Utah | 400,000 | 2.50 | 2,220,000 | Mar. '08 | 0.05 |
| Mary McKinney, g. | Colo | 1,309,252 | 1 | 894,362 | June '10 | 0.01 |
| May Day, g. s. l. | Utah | 800,000 | 0.25 | 108,000 | Sept. '08 | 0.01½ |
| Mohawk M. Co. | Mich | 100,000 | 25 | 2,050,000 | Feb. '10 | 1.00 |
| Mont. Ore Purch. | Mont | 80,833 | 25 | 9,437,274 | Jan. '07 | 15.00 |
| Nevada Cons., c. | Nev | 1,151,200 | 5.00 | 1,294,900 | Mar. '10 | 0.37½ |
| Nevada Hills, s.g. | Nev | 746,000 | 5 | 373,000 | Dec. '07 | 0.10 |
| New Century, z.l. | Mo | 300,000 | 1 | 216,000 | Oct. '09 | 0.01 |
| Newhouse M. & S. c. | Utah | 600,000 | 10 | 300,000 | Sept. '07 | 0.50 |
| New Idria, q. | Cal | 100,000 | 5 | 1,260,000 | July '10 | 0.30 |
| New Jersey Zinc | U. S | 100,000 | 100 | 12,000,000 | May '08 | 4.00 |
| North Butte, c. | Mont | 400,000 | 15 | 8,800,000 | Mar. '10 | 0.50 |
| North Star, g. | Cal | 250,000 | 10 | 2,686,999 | June '10 | 0.50 |
| Old Dominion, c. | Ariz | 293,245 | 25 | 1,440,658 | Jan. '10 | 0.50 |
| OldDomin'n,M&Sm. | Ariz | 162,000 | 25 | 1,225,500 | July '10 | 0.25 |
| Ophir, g. s. | Nev | 201,600 | 3 | 1,816,360 | May '08 | 0.10 |
| OrovilleDredg'gLt.g. | Cal | 700,000 | 5 | 1,383,036 | Dec. '09 | 0.12½ |
| Osceola, c. | Mich | 96,150 | 25 | 8,958,650 | July '10 | 4.00 |
| Parrot, c. s. | Mont | 229,850 | 10 | 6,807,649 | Sept. '07 | 0.25 |
| Phelps, Dodge & Co. | U. S | 449,346 | 100 | 7,638,882 | June '10 | 2.50 |
| Portland, g. | Colo | 3,000,000 | 1 | 8,557,080 | Apr. '10 | 0.02 |
| Quartette, g. s. | Nev | 110,000 | 10 | 375,000 | July '07 | 0.20 |
| Quincy, c. | Mich | 110,000 | 25 | 19,192,500 | June '10 | 1.25 |
| Round Mountain, g. | Nev | 800,000 | 1 | 292,650 | June '10 | 0.04 |
| St. Joseph, l. | Mo | 1,000,000 | 10 | 7,058,357 | June '10 | 0.15 |
| Shannon, c. | Ariz | 100,000 | 10 | 450,000 | July '07 | 0.50 |
| Silver King Co't'n.† | Utah | 1,250,000 | 5 | 1,659,885 | Jan. '10 | 0.15 |
| Sioux Con., s. l. g. | Utah | 746,389 | 1 | 723,073 | Apr. '10 | 0.04 |
| Snow Storm, s. l. | Ida | 1,500,000 | 1 | 937,500 | June '10 | 0.01½ |
| Standard Con., g.s. | Cal | 178,394 | 10 | 5,327,925 | Jan. '10 | 0.75 |
| Stratton's Independ. | Colo | 1,000,000 | 5 | 5,395,865 | Apr. '10 | 0.50 |
| Swansea, g. s. l. | Utah | 100,000 | 5 | 329,500 | Mar. '07 | 0.05 |
| Tamarack, c. | Mich | 60,000 | 25 | 9,420,000 | July '07 | 4.00 |
| Tennessee, c. | Tenn | 200,000 | 25 | 2,306,250 | Dec. '09 | 1.25 |
| Tomboy, g. s. | Colo | 300,000 | 4.85 | 3,304,000 | Dec. '09 | 0.48 |
| Tonopah of Nev, s g. | Nev | 1,000,000 | 1 | 6,050,000 | July '10 | 0.40 |
| Tonopah Belm't, s.g. | Nev | 1,500,000 | 1 | 600,000 | Apr. '07 | 0.10 |
| Tonopah Ext'n, s. g. | Nev | 943,433 | 1 | 283,030 | Apr. '06 | 0.15 |
| Tonopah Midw'y,s.g. | Nev | 1,000,000 | 1 | 250,000 | Jan. '07 | 0.05 |
| Uncle Sam, g. s. l. | Utah | 500,000 | 1 | 340,000 | Dec. '09 | 0.02 |
| United Cop. com. | Mont | 450,000 | 100 | 5,962,500 | Aug. '07 | 1.75 |
| United, c. pf. | Mont | 50,000 | 100 | 1,500,000 | May '07 | 3.00 |
| United, z. l., pf. | Mo.-Kan. | 19,556 | 25 | 312,782 | Jan. '08 | 0.50 |
| United Verde, c. | Ariz | 299,927 | 10 | ..... | June '10 | 0.75 |
| U.S.Sm.R.&M.,pf. | U. S | 351,010 | 50 | 2,807,252 | Apr. '10 | 0.87½ |
| U.S.Sm.R.&M.,com. | U. S | 486,044 | 50 | 6,826,011 | Apr. '10 | 0.50 |
| U. S. Red. & Ref. Pf. | Colo | 39,458 | 100 | 1,005,504 | Oct. '07 | 1.50 |
| Utah, g. (Fish Sp'gs) | Utah | 100,000 | 10 | 323,000 | Feb. '09 | 0.02 |
| Utah Con., c. | Utah | 300,000 | 5 | 6,900,000 | Jan. '10 | 0.50 |
| Utah Copper | Utah | 733,624 | 10 | 3,260,861 | June '10 | 0.75 |
| Victoria, Utah | Utah | 250,000 | 1 | 182,000 | Dec. '09 | 0.02 |
| Vindicator Con., g. | Colo | 1,500,000 | 1 | 2,092,500 | Jan. '10 | 0.03 |
| Wolverine, c. | Mich | 60,000 | 25 | 5,700,000 | Sept. '09 | 5.00 |
| Work, g. | Colo | 1,500,000 | 1 | 172,500 | July '08 | 0.01 |
| Yankee Con. | Utah | 1,000,000 | 1 | 182,500 | Jan. '07 | 0.03 |
| Yellow Aster, g. | Cal | 100,000 | 10 | 958,789 | Aug. '07 | 0.20 |
| Yukon Gold, g. | U.S.&Can. | 3,500,000 | 5 | 1,400,000 | June '10 | 0.10 |

Divided previous to consolidation. *$1,436,250. †$11,187,500.

## Coal, Iron and Other Industrials—United States

| Name of Company and Situation. | | Shares. Issued. | Par Val. | Dividends. Total to Date. | Latest. Date. | Amt. |
|---|---|---|---|---|---|---|
| Allis-Chalmers, pf. | U. S | 161,500 | $100 | $3,108,875 | Feb. '04 | $1.75 |
| Amer. Ag.Chem., pf. | U. S | 181,530 | 100 | 2,836,800 | Apr. '10 | 3.00 |
| American Cement. | Penn | 200,000 | 10 | 1,388,000 | July '10 | 0.10 |
| American Coal | Md | 50,000 | 25 | 2,609,687 | Mar. '10 | 0.75 |
| Bethlehem Steel, pf. | Penn | 150,000 | 100 | 900,000 | Nov. '06 | 0.75 |
| Cambria Steel | Penn | 900,000 | 50 | 10,585,000 | May '10 | 0.62½ |
| Central C. & C., com. | Mo | 51,250 | 100 | 2,690,625 | Jan. '10 | 1.50 |
| Central C. & C., pf. | Mo | 18,750 | 100 | 1,479,999 | Jan. '10 | 1.25 |
| Col.&Hock.C.&I.,pf. | Ohio | 69,244 | 100 | 591,550 | Oct. '09 | 1.50 |
| Consolidated Coal. | Ill | 50,000 | 100 | 350,000 | July '04 | 1.00 |
| Consolidation Coal. | Md | 190,247 | 100 | x17,591,510 | Apr. '10 | 1.50 |
| Crucible Steel, pf. | Penn | 244,365 | 100 | 9,102,596 | Sept. '09 | 1.50 |
| Empire S. & I., pf. | N. J | 25,000 | 100 | 1,008,033 | Jan. '10 | 1.50 |
| Fairmont Coal | W. Va | 120,000 | 100 | 1,980,000 | Jan. '09 | 2.00 |
| General Chem., com. | U. S | 74,103 | 100 | z3,371,684 | June '10 | 1.25 |
| General Chem., pf. | U. S | 100,000 | 100 | 7,005,000 | July '10 | 1.50 |
| International Salt. | Penn | 182,280 | 100 | 911,400 | Dec. '06 | 1.00 |
| Jeff.&Cl'f C.&I., cm. | Penn | 15,000 | 100 | 330,000 | Aug. '05 | 5.00 |
| Jeff. & Cl'f C. & I.,pf. | Penn | 15,000 | 100 | 975,000 | Feb. '10 | 2.50 |
| Kern River Oil | Cal | 20,000 | 100 | 84,000 | July '08 | 0.18 |
| Lehigh Coal & Nav. | Penn | 382,260 | 50 | y18,268,900 | Aug. '10 | 2.00 |
| Maryland Coal, pf. | Md | 18,850 | 100 | 2,061,122 | June '09 | 2.50 |
| Monon. R. Coal, pf. | Penn | 100,000 | 100 | 2,324,000 | July '08 | 3.50 |
| Nat. Carbon, com. | U. S | 55,000 | 100 | 715,000 | Apr. '08 | 1.00 |
| Nat. Carbon, pf. | U. S | 45,000 | 100 | 3,071,259 | Nov. '08 | 1.75 |
| National Lead, com. | N. Y | 206,554 | 100 | 4,231,095 | July '10 | 1.25 |
| National Lead, pf. | N. Y | 243,676 | 100 | 19,529,574 | June '10 | 1.75 |
| Nat'l Steel&Wire,pf. | N. Y | 25,778 | 100 | 631,561 | May '06 | 1.75 |
| New Central Coal. | Md | 50,000 | 20 | 390,000 | Nov. '08 | 0.40 |
| New River Coal, pf. | W. Va | 37,617 | 100 | 451,405 | Nov. '08 | 1.50 |
| Pacific Coast Borax | Cal | 19,000 | 100 | 2,086,500 | Aug. '05 | 1.00 |
| Peerless Oil | Cal | 92,000 | 10 | 711,000 | June '08 | 0.06 |
| Penna. Salt | Penn | 60,000 | 50 | 15,098,000 | Oct. '08 | 3.00 |
| Penna. Steel, pf. | Penn | 165,000 | 100 | 8,662,500 | Nov. '08 | 3.50 |
| Phila. Gas, com. | Penn | 664,800 | 50 | *24,264,600 | Feb. '09 | 0.75 |
| Phila. Gas, pf. | Penn | 120,000 | 50 | 2,850,000 | Sept. '08 | 1.25 |
| Pittsburg Coal, pf. | Penn | 297,010 | 100 | 11,806,225 | Apr. '10 | 1.25 |
| PocahontasC.C., pf.† | W. Va | 28,000 | 100 | 336,000 | July '09 | 3.00 |
| Pocah'tasC.C., cm.† | W. Va | 45,900 | 100 | †406,800 | Oct. '08 | 3.00 |
| Republic I. & S., pf. | Ill | 204,169 | 100 | 9,262,998 | July '10 | 1.75 |
| Sloss-Sheffield, com. | Ala | 100,000 | 100 | 2,383,000 | June '10 | 1.25 |
| Sloss-Sheffield, pf. | Ala | 67,000 | 100 | 4,572,400 | July '10 | 1.75 |
| Standard Oil | U. S | 970,000 | 100 | 691,602,000 | June '10 | 9.00 |
| Tenn. C. & I., com. | Tenn | 225,536 | 100 | 3,583,060 | Nov. '07 | 1.00 |
| Tenn. C. & I., pf. | Tenn | 2,840 | 100 | 390,040 | Nov. '07 | 2.00 |
| Texas&Pacific Coal. | Texas | 23,940 | 100 | 1,747,620 | Apr. '09 | 1.50 |
| Uni. Metals Selling. | U. S | 50,000 | 100 | 5,875,000 | Jan. '09 | 5.00 |
| U.S. Steel Corp., cm. | U. S | 5,083,025 | 100 | 110,033,936 | June '10 | 1.25 |
| U. S. Steel Corp., pf. | U. S | 3,602,811 | 100 | 263,109,705 | May '10 | 1.75 |
| Va Carolina Ch., pf. | U. S | 180,000 | 100 | 16,140,869 | July '10 | 2.00 |
| Warwick I. & S. | U. S | 148,671 | 10 | 572,340 | May '10 | 0.30 |
| Westmoreland Coal. | Penn | 60,000 | 50 | 8,880,000 | Oct. '08 | 2.50 |

*Since 1894. †Since 1907. ‡Since 1890. xStock div. $6,130,000 Mar. '09. yStock div. $2,866,950 Jan. '10. z Stock div. 10 per cent. Mar. '10.

## Canada, Mexico, Central and South America

| Name of Company and Situation. | | Shares. Issued. | Par Val | Dividends. Total to Date. | Latest. Date. | Amt. |
|---|---|---|---|---|---|---|
| Amistad y Conc'rdia | Mex | 9,600 | $ 50 | $417,070 | Apr. '08 | $1.36 |
| Batopilas | Mex | 446,486 | 20 | †55,870 | Dec. '07 | 0.12½ |
| British Columbia, c. | B. C | 591,709 | 5 | 236,683 | Sept. '07 | 0.40 |
| Buffalo, s. | Ont | 1,000,000 | 1 | 897,000 | July '10 | 0.08 |
| Butters' Salvador, g. | Salv | 150,000 | 4.85 | 2,764,500 | ..... | 0.17½ |
| Cobalt Central, s. | Ont | 5,000,000 | 1 | 188,460 | Aug. '09 | 0.01 |
| Coniagas | Ont | 800,000 | 5 | 1,160,000 | July '09 | 0.15 |
| Consolidated M. & S. | B. C | 53,552 | 100 | 781,885 | Nov. '07 | 1.25 |
| Crow's Nest Pass. | B. C | 160,000 | 25 | 2,018,648 | July '07 | 0.62½ |
| Crown Reserve, s. | Ont | 1,750,000 | 1 | 2,158,828 | July '10 | 0.15 |
| Dolores, g. s. | Mex | 400,000 | 5 | 954,866 | May '10 | 0.22½ |
| Dominion Coal, com. | N. S | 150,000 | 100 | 3,900,000 | Jan. '10 | 1.00 |
| Dominion Coal, pf. | N. S | 50,000 | 100 | 3,865,000 | Feb. '10 | 3.50 |
| Dos Estrellas, g.s. | Mex | 300,000 | 0.50 | 5,430,000 | Jan. '10 | 0.50 |
| El Oro, g.s. | Mex | 1,147,500 | 4.85 | 5,402,700 | Dec. '09 | 0.36 |
| Esperanza, s.g. | Mex | 455,000 | 4.85 | 10,178,567 | June '10 | 0.36 |
| Granby Con | B. C | 135,000 | 100 | 3,778,630 | Dec. '09 | 2.00 |
| Greene Con. Copper. | Mex | 864,000 | 10 | 6,194,400 | Mar. '07 | 0.40 |
| Guanajuato | Mex | 540,000 | 5 | 74,250 | Oct. '06 | 0.07 |
| Guanajuato D., pf.s. | Mex | 10,000 | 100 | 214,356 | Jan. '10 | 3.00 |
| Hedley Gold, g. | B. C | 120,000 | 10 | 108,000 | July '10 | 0.30 |
| Hinds Con., g.s.c.l. | Mex | 5,000,000 | 1 | 100,000 | Feb. '08 | 0.02 |
| Kerr Lake, s. | Ont | 600,000 | 5 | 2,130,000 | June '10 | 0.50 |
| La Rose Con., s. | Ont | 1,498,407 | 5 | 1,677,980 | July '10 | 0.10 |
| Le Roi, Ltd., g. | B. C | 200,000 | 25 | 425,000 | Dec. '06 | 0.48 |
| Le Roi No. 2, g. | B. C | 120,000 | 25 | 1,004,400 | Mar. '10 | 0.48 |
| Lucky Tiger-Com.,g. | Mex | 715,000 | 10 | 552,500 | Feb. '10 | 0.05 |
| McKinley-Darragh,s | Ont | 2,247,692 | 1 | 696,784 | July '10 | 0.05 |
| Mex. Con. M.&S. Co. | Mex | 240,000 | 10 | 660,000 | Mar. '08 | 0.25 |
| Mex. Mill.&Trans.pf. | Mex | 10,500 | 100 | 65,858 | July '08 | 3.00 |
| Mines Co. of Am. | Mex | 2,000,000 | 1 | 3,845,000 | Aug. '10 | 0.03 |
| N. Y. & Hond. Ros. | C. A | 150,000 | 10 | 2,910,000 | May '10 | 0.10½ |
| Nipissing, s. | Ont | 1,200,000 | 5 | 4,575,000 | Jnne '10 | 0.25 |
| N. S. St.&Coal, com. | N. S | 60,000 | 100 | 1,140,279 | Jan. '10 | 1.00 |
| N. S. St. & Coal, pf. | N. S | 10,300 | 100 | 721,000 | Oct. '09 | 2.00 |
| Peñoles. | Mex | 2,500 | 50 | 4,866,687 | Dec. '07 | 10.00 |
| Peregrina M. & M.,pf. | Mex | 10,000 | 100 | 293,656 | Mar. '10 | 3.50 |
| Pinguico, pf. s. | Mex | 20,000 | 100 | 420,000 | Apr. '10 | 3.00 |
| Reco, g.s.l. | B. C | 985,000 | 1 | 332,482 | Mar. '06 | 0.02 |
| Right of Way Mines‡ | Ont | 1,685,500 | 1.00 | 392,063 | Apr. '10 | 0.02 |
| Rio Plata | Mex | 373,437 | 5.00 | 102,694 | June '10 | 0.10 |
| Securities Corp., pf. | Mex | 2,000 | 100 | 42,699 | July '08 | 3.50 |
| Silver Queen, s. | Ont | 1,500,000 | 1 | 315,000 | Dec. '08 | 0.03 |
| Temiskaming, s. | Ont | 2,500,000 | 1 | 525,000 | Apr. '09 | 0.06 |
| Tem. & Hud. Bay,s. | Ont | 7,761 | 1 | 1,265,043 | May '10 | 3.00 |
| Teziutlan Copper. | Mex | 10,000 | 100 | ..... | Dec. '08 | 1.20 |
| Tilt Cove, c. | N. F | 44,500 | 9.72 | 318,620 | Dec. '09 | 0.24 |
| Trethewey, s. | Ont | 1,000,000 | 1 | 461,998 | Dec. '09 | 0.15 |
| Tyee, c. | B. C | 180,000 | 5 | 284,310 | Aug. '07 | 0.63 |

†Since reorganization. ‡Previous to Jan. 1910, $324,644.